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# **The chorography of the modern city**

A thesis submitted in fulfilment of the requirements  
for the degree of Doctor in Philosophy by

**Gabriela Garcia de Cortazar Galleguillos**

MA AH UCL, BArch Universidad de Chile

Director of studies: Mark Cousins

Second supervisor: Pier Vittorio Aureli

The Open University  
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# The chorography of the modern city

## Abstract

Until the nineteenth century, space was represented and produced through mathematically constructed drawings: plans and sections captured buildings and the scientific map recorded the territory. The development of technologies of transport brought crisis into this static and balanced world as speed and displacement radically reconfigured the subject's orientation. This thesis examines the maps, plans, guides and signs produced in Britain in the nineteenth and twentieth century to accompany railway travelling, motoring, underground commuting and walking in the city, arguing that they indeed became chorographies of the modern metropolis. These modern chorographies not only exploited the possibilities of the *graphein* in order to deal with the complexities of space, time and movement, but they also prescribed a very specific knowledge, one that dictated a new way of being in space. In fact, they created a new set of spaces altogether.



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# Introduction

In 1996, UN studio started designing Arnhem Central. It took them twenty years to complete the transport hub – in their own words, because of the complexity of the programme. Complex it was: a masterplan for the area (a former train station), and a so-called transfer hall for connecting railway, bikes, cars, trolleys, buses, taxis and pedestrians; it also involved the design of two towers, underground parking and bicycle storage. Several authorities were involved in the process and the project meant taking care of an area of around 40,000 m<sup>2</sup>. Ben van Berkel, talking about the project at the AA one May evening of this year, tried to convey the difficulties they encountered in solving this knot, and how one particular form provided all their answers. For them the solution was a twist, derived from their recurrent moebius strip, as it allowed them to distribute and connect the different parts of the programme while being, at the same time, their main structural and spatial solution.

The ambitions of the project didn't stop there. As van Berkel said, their aim was that the building, the 'transfer hall', was to be the sole instrument guiding the people towards their destinations. He wanted it to be free of signs, boards, and written instructions and let the building guide, attract and orient its users; he wanted the building to speak for itself. As if the project weren't hard enough, as if the architecture and urban design of a transport hub in the twenty-first century weren't sufficient a problem, Arnhem Central's own disciplinary quest (because this is a quest that comes only from the architects) was an attempt to regain architecture's long-lost ability to communicate. No minor feat: if we are to believe Victor Hugo, histories vacated buildings with the invention of the printing press. Before that, buildings both told stories and oriented – the latter a feature intrinsic to the built, whether it was the foundational *cardo* and *decumano*, or all the altars of all the churches pointing towards the rising sun.

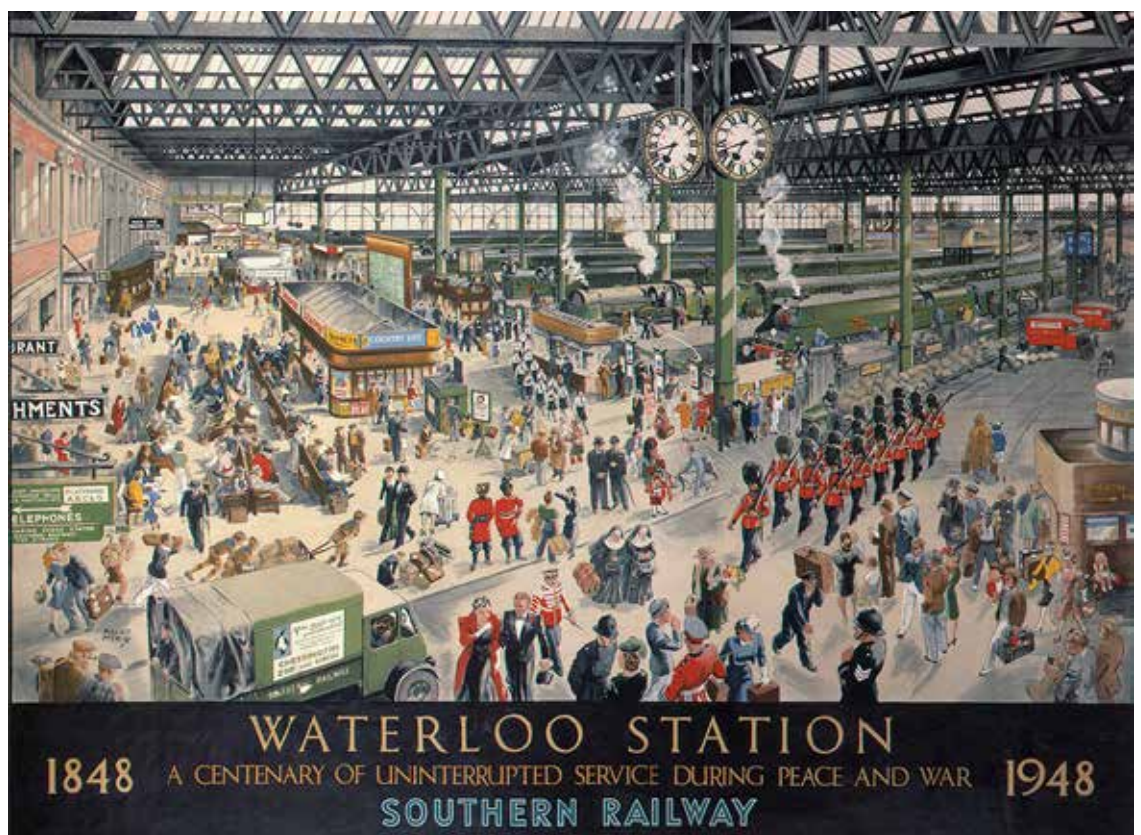
Arnhem's challenge can be put in a simple sentence: the architects wanted to reinvent the type. The train station typology was no longer of service in spatial terms,



in terms of its use or, actually, in that of its name. Ben van Berkel, when talking about the project, corrects himself many times from 'train station' to 'transfer hall' – a transport hub of the twenty-first century is, in its name, something much more elusive than a place where trains are stationed. Their criticism of the dominant type starts with the impossibility of juggling with all the programmatic requirements and of reconciling them with the train station typology. Their organisation diagrams (which, as all diagrams coming from practices with parametric tendencies, is not totally abstract but keeps a sort of geographic reference) show a star-like formation of dots and connections, different points of arrival for different modes of transport. For such a multidirectional organisation, the simplicity of the concourse plus train shed wasn't enough. In the train station typology, architecture recedes to the background – or should we say, to the roof. A typical train station, from the nineteenth century till now, is simply that: a big roof spanning train tracks, and another big roof covering the concourse. This second big roof allows for the proliferation of small-scale architectures, often banal and popular, which take care of information, tickets, snacks, literature, toilets and the like. This withdrawal perhaps doesn't suit parametricism's confidence in form – after all, it is precisely a form that their data is producing.

In this project, the receding roof is replaced by a very central twist: architecture, instead of effacing itself, revolves around the winding surfaces of this column-floor-roof-everything. The twist's job is not only structural, but also organisational: it distributes people and programme, it administers the building's use. This it does by rejecting another inheritance from train station history: its dependency upon information. In his AA talk, Ben van Berkel showed the wonderful drawing by Helen McKie depicting Waterloo station in times of war and peace: the station is crowded with people coming and going, but it is also crammed with words and signs – refreshments here, restaurant there, telephones over there. Then there are all the words and signs in the big map that most probably showed the train network, and in the boards stating platform numbers and routes and times and fares. And there are even more words: all the words that can be found in newsagent shops, in their signs and boards, but also *inside* the newspapers and guides they are selling. All this, the architects don't need anymore: they are confident that the transfer hall's gentle slopes will channel people, and the partial vistas unfolding as they walk will be enough, will be self-explanatory. An information post stands alone in the twist, almost as a sculpture or even an internal joke, its arrows pointing in all directions.

Arnhem Central is not a train station, it is not used as such and it doesn't look like one. Both the programmatic requirements and the architects' agenda confabulated into a twofold redefinition of what this building was. The first redefinition concerns the building type: the train station is an obsolete type that cannot sustain the requirements of contemporary transport – enters the intermodal hub with a multidirectional 'transfer hall' instead of concourse. The second redefinition has a larger



1. Waterloo Station, war  
Helen McKie, 1943  
Science Museum Group/  
National Railway Museum

2. Waterloo station, peace  
Helen McKie, 1948  
Science Museum Group/  
National Railway Museum

scope, one with repercussions over the whole of the discipline: by rejecting all signs and wayfinding instruments, the building subscribes to a pre-modern condition where buildings oriented people without recourse to them. This is the most interesting of the two by far. UN studio's self-imposed task, in those twenty years the building was in the making, was to tackle a history that had accumulated (just as the signs in the station) for at least three centuries – without counting Victor Hugo's proclamation.

The story of this accumulation is the story this thesis tells. After the printing press killed the building, the first came to rescue and revive the second, but only as a holder of heaps and heaps of printed, painted, applied words. This thesis looks at one particular pile of words, drawings and diagrams: the one that amassed around movement, within and without the modern metropolis *par excellence*, London. It can be seen in the McKie drawing: Waterloo station, a sea of activity, only to be navigated with the help of words (in the form of signs, guides, maps, diagrams, etc), their presence perhaps more visible than the architecture itself. This amalgam between building and words is there to help make sense of the new fields (in both literal and metaphorical sense) opened up by the train: how to orient oneself when moving at high speed over unknown territories? And how to find your way after being spat out into the busy station's concourse? As the new transport technologies made formerly inaccessible parts of the country easily available, and as it became increasingly ordinary to move at great speeds, the subject's orientation was redefined. If orientation is knowing where one is in space in terms of a frame of knowledge, technological change meant the expansion of this frame from the local to the global and from the experiential to the abstract. Orientation was removed from the body and relocated to wayfinding aids: the subject, being moved instead of moving, had to *be oriented*, and this is the task of the aids.

But where did all these wayfinding aids get all *their* knowledge from? In Britain, the actual basis for these popular instruments was the map, the Ordnance Survey: the scientific survey of Britain allowed knowing the nation's territory as a whole – its extension, its intricacies, its details. The Ordnance Survey provided an accurate, objective, faithful, true rendering of the territory: it became the new measure of knowledge. All that you needed to know regarding where you were was contained in the Ordnance Survey: what the eyes saw could be supplemented, informed, or even corrected, by what the map revealed from its absolute vantage point. The scientific map's view, however, immediately proved insufficient: they hadn't finished drawing when the portrayed subject changed – and it did with a speed that made it impossible for the map to catch up. As the drawing of the land to scale enabled the laying of train tracks, the digging and bridging, and then the application of a smooth coat of tarmac, and so on, the map not only registered the territory as found, but especially as potential. It was only appropriate that the wayfinding aids associated with the new technologies of transport adopted the Ordnance Survey maps as basis for their own drawings.

Nowhere was the need for an enhanced view as imperative as in the city, yet nowhere was this more problematic. Modern London, unbound, growing and in constant movement due to the proliferation of transport technologies, became unrepresentable by the map, especially because the map could only offer a static, topographical view of it, since the map stays on the surface of things. The other way of getting hold of the built, the architectural plan, does lift the veil over the interior (across topography into the anatomy of things), but does it in a scale too detailed to be able to produce a sense of the whole. Modern space could not just be represented: it had to be captured in a different way. Bearers of change, the technologies of transport provided a solution for the problem of how to capture the city. In the gap left by the map and the plan, the popular guides, maps and signs had the task of not only representing the modern metropolis, which became opaque to direct experience, but also of offering the instructions for how to move through space. In a city where movement (travelling, commuting) was intrinsic to its development, the popular map not only *described* it, but *prescribed* a way of moving through it, of using it: in this sense, the popular map became a manual to the city. The myriad of manuals offered a kaleidoscopic image of London, one that not only captured it in its spatial, built form, but also its way of functioning.

It is in this seemingly supplementary role that the power of the wayfinding aids lies: just as it became natural to move without exerting the body, it also became natural to gather knowledge not from direct seeing but from mediated reading. As such, these manuals succeed in installing the view from above introduced by the map as the de facto way of knowing the metropolis. The technologies of transport redefined the way in which people moved and led to the appearance of graphic doubles that didn't stay in the realm of representations but were now incorporated in the fabric of the city – these manuals were tools for knowing the city and part of the city itself. If orientation used to be a function of the body and the built, in the modern metropolis it depends on the manual, a functioning apparatus. The modern landscape is not so much seen as *read*, and the subject is forced to adapt to, and adopt, a certain type of literacy, one that presents the text of the city while shaping her or his subjectivity. If vision is central for the constitution of the modern subject<sup>1</sup>, these manuals, administering ways of seeing, also participate in that constitution. And if the new landscapes of modernity were too shocking for the metropolitan subject, these manuals to the city were there to ease the way into them<sup>2</sup>.

The London of the modern citizen is thus one that is seen from above and understood as a collection of functions; one that is not static as the territory that the OS attempted to describe, but where movement is essential. To cover movement these manuals come up with a series of techniques. The orientation apparatuses are radically original graphic tools because they are forced to come to terms with a moving object, and they are also compelled to relay it in innovative ways to the

moving subject. These they do, this thesis argues, by exploiting the possibilities of the *graphein* (Ptolemy's word, meaning *both* writing and drawing) in what turns out to be modern chorographies: if from Ptolemy to the scientific map, chorography had been a pictorial representation of a parcel of land, in modern chorographies the term *graph* no longer stands for the pictorial but for the abstract. As such, they push the point of view from the bird's eye vantage point (the one behind the map) to an immanent, omnipresent eye – the all-seeing eye of systemic abstraction, lying not above or beneath, but within. These modern chorographies are thus understandable through the history of representations but they go beyond this history.

The thesis develops the history of the use of these modern chorographies, of these manuals to the city, and how they shape the modern subject's orientation by prescribing new ways of seeing. The thesis studies primary sources (from understudied, commercial, popular ephemera associated with travelling to objects that are now considered icons of British graphic design) that have neither been examined in relation to the new transport technologies they accompany nor in relation to their possible effects in the construction of subjectivity<sup>3</sup>. They are all British, and although some correspond to similar objects in other industrialised cultures, they are all intrinsic to this isle – something that does not make them less relevant to the rest of the world but, on the contrary. That London was the capital of an empire and the cradle of both capitalism and its critique, make these ordinary objects part of an extraordinary world.

Chapter 1 takes a **view from above** to examine how the map materialised a rational vision of the land, as the Ordnance Survey is the Enlightened view made drawing. Chapter 2 goes **over the territory** to inspect the new point of view provided by the railway, one that because it moves signifies a radical change to the one constructed by the map and its tradition. Chapter 3 scrutinises what took place **on the road**, as the car brought a new way of moving about, different from the one introduced by the railway. Chapter 4 focuses on what happened **under the ground**, as metropolitan transport carved its way through London, in a medium that had only been explored for infrastructure. Chapter 5 re-emerges to the surface to see the changes **in the streets**, for if travelling, driving and commuting had made an impact on the metropolitan subject, then perhaps walking had also changed. Finally, Chapter 6 exercises the **view from within**, analysing the postcode as provider of a bodyless system of orientation, one that started moving objects and ended up directing people's paces. The thesis thus provides a historical understanding of orientation, by weaving together issues of vision, writing, drawing and movement through the examination of their material presence in all scales of space (from train station, to metropolis, to territory), whether architects like it or not.

1 See especially Jonathan Crary's *Techniques of the Observer: On vision and modernity in the nineteenth century* (Cambridge, Mass.: MIT Press, 2005)

2 It is Wolfgang Schivelbusch who writes about railway travelling as 'shocking'. He cites Simmel and Freud to explain how the modern subject dealt with the new experiences, making a parallel between Simmel's 'stimuli shield' and Freud's 'layer of civilisation' as what the modern subject needs to acquire in order to deal with the shockingly new landscapes of modernity. This thesis proposes that the maps, guides, signs and other manuals are indeed administering a 'layer of civilisation', as will be developed in the following chapters. See Wolfgang Schivelbusch, *The railway journey: the industrialization of time and space in the 19th century* (Berkeley: University of California Press, 1986)

3 Except for Schivelbusch, who together with Crary inspired the approach to the objects (although none mentions these orientation aids).





## The view from above

### Air / Earth

A sheep, a duck and a cockerel were the first living beings that looked down from a hot air balloon. Mounted in one of the Montgolfier brothers' fabrications in September 1783, what they saw were the vast extensions of pre-revolutionary Versailles. Things moved quickly in the science of ballooning: between the first manned flights, tethered and modest, in October of the same year, and the first free ascension, achieved by Pilatre de Rozier and the Marquis François d'Arlandes, only one month had passed. From the other side of the Channel, Joseph Banks, the then president of the Royal Society, had trouble accepting that this could be even possible, as he didn't understand the opportunities that flight offered for humans: centuries of attachment to the Earth's crust made him blind to its implications<sup>1</sup>. Montgolfier, on the contrary, found that the view from above sold well, making hot-air balloons not only a respectable scientific endeavour, but also a profitable spectacle.

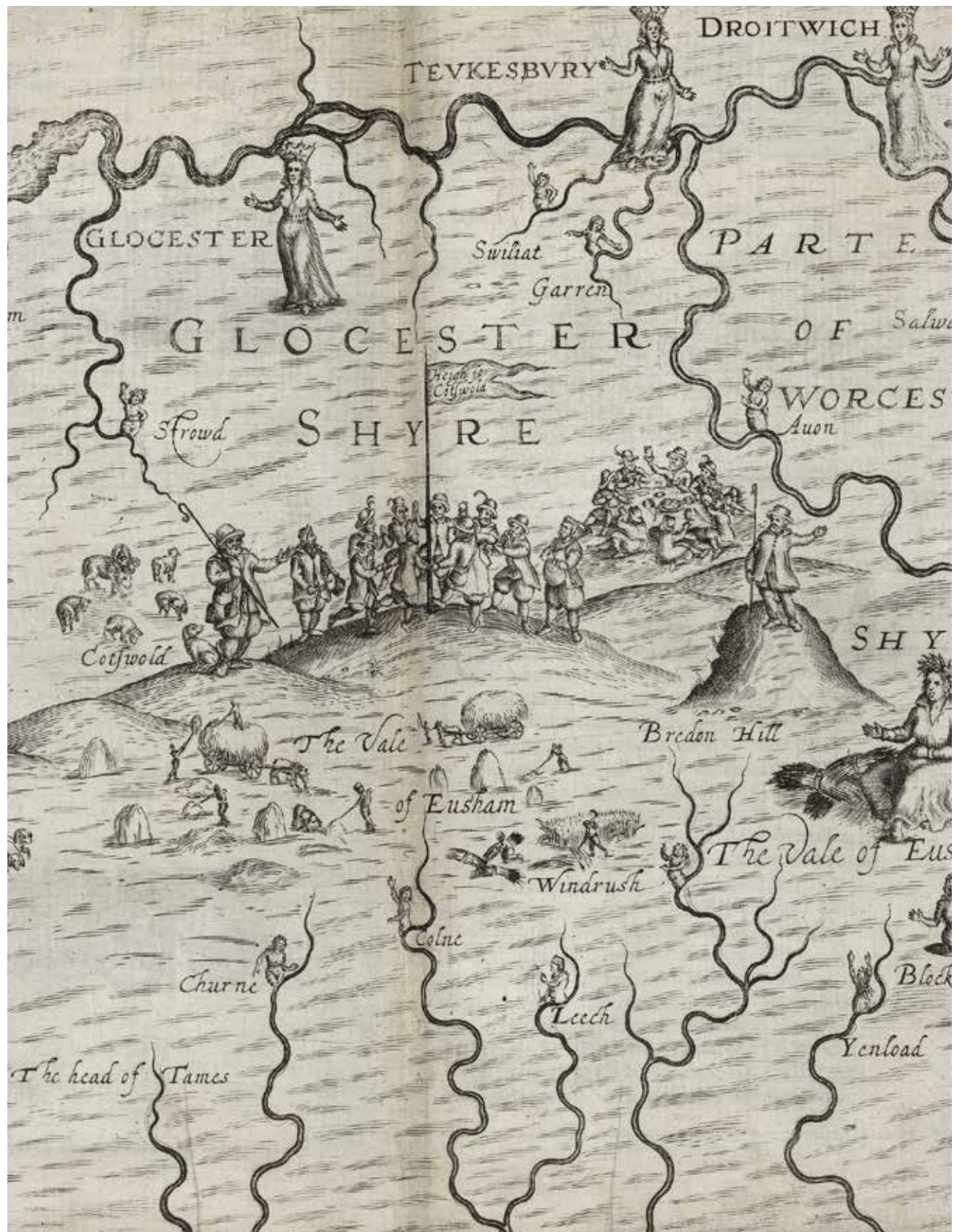
Vincent Lunardi popularised the hot-air balloon in Britain, first rising above the astonished eyes of Royals and mortals on the 15 September 1784. The skies of England and France were busy that year, with nearly two-hundred manned ascents taking place. What these trips up revealed was astounding, yet it wasn't the newly conquered air that concentrated the balloonists' sight, but the old surfaces of the earth below them. In the end, going up was just a new way of achieving a different way of looking down: apart from some atmospheric interest and the nascent science of meteorology<sup>2</sup>, people were mostly fascinated with how we looked from up there. During the years of the Napoleonic wars, air traffic was suspected of unfriendly intentions and was therefore prohibited and by the beginning of the nineteenth century, interest had dwindled. Before long, accounts like Thomas Baldwin's *Airopaidia* (1786), where his views of the Earth's surfaces were captured in colour and line drawings, were enough for the people below – in the end, just like Banks, we like being earthbound.



At about the time that animals and men went up in the newly invented balloons, the Ordnance Survey was in the making. The Ordnance Survey is the map that inaugurates modernity: it is the first map that describes the whole of Great Britain, the first that establishes and develops a scientific method, and is the product of the needs of a centralised government. As such, it is both the result and beginning of an endless relationship between present and future, where the map itself is the fulcrum between what is found and what is possible. The Ordnance Survey also made available the same view that could be attained by going up into the air – and in a far more secure way. No sweat, there it is: the same flatness, the same colours, even clearer, thanks to the lack of clouds. You can even find your way around with it, plan a hike, calculate your time of arrival with it, as distances are precisely, mathematically, reduced. You can stay with your feet on the ground and have the world in your hand – a very democratic feat.

Before the all-encompassing eye of the Ordnance Survey, Britain was subjected to partiality. Until then, the most official renditions of the territory were Christopher Saxton's "thirty-four county maps and one general map", published between 1574 and 1579, which formed the "first national atlas in this country", a private enterprise promoted by Queen Elizabeth I (or her ministers)<sup>3</sup>. There were maps produced by private publishers that were only 'sufficiently exact' for the common eye but 'extremely defective' to that of the eighteen-century scientific-minded man<sup>4</sup>. Perhaps the most comprehensive view of the whole remained that of Michael Drayton's *Poly-Olbion*, a 1612 topographical poem (reprinted and enlarged in 1622) covering England and Wales (and Scotland, if only Drayton had survived the two firsts)<sup>5</sup>.

The *Poly-Olbion* (meaning "many blessings", but also a reference to Albion) with its thirty songs written in iambic hexameter, described in 15,000 lines the "*Tracts, Rivers, Mountaines, Forests, and other Parts of this renowned Isle of Great Britaine, With intermixture of the most Remarquable Stories, Antiquities, Wonders, Rarities, Pleasures, and Commodities of the same, Digested in a Poem*"; and to help digest, thirty county maps engraved by William Holden, and supporting illustrations by John Selden. The *Poly-Olbion* provided a detailed view of the whole, through words and drawings, for its subject was indeed too complex to be reduced to just either. Although stemming from an earthbound position (Drayton's desk), the *Poly-Olbion* offered total knowledge, something that the Ordnance Survey, in its eighteen-century language, would also strive to achieve – and a feat that ballooning could never attain. For the view from above, it turns out, is only capable of harnessing total knowledge if it indeed sees everything – something that unfortunately the first air-bound sheep, duck and cockerel cannot say they did.



1. Map of Gloucestershire (detail), Poly-Olbion Michael Drayton, 1612

## Part / whole

The view from above that the hot-air balloon granted had been widely anticipated, to say the least. Since the ancient Greeks, it had been a coveted one: the mortal's insufficient vision prompted the need to record what they saw, both through narrative and drawing, an insufficiency that accounts for the invention of history and geography as records of the world<sup>6</sup>. When compared to the total view of the gods (or the muses, or the Pythia, the Delphi oracle), who can see all the grains of sand of all the world, having microscopic and macroscopic vision *at the same time*, human vision is indeed not enough. The quest for that eusynoptic, ekphrastic vision, and the struggles to capture it and preserve it, would finally come to an end thanks to science.

This mortal insufficiency was at the beginning of the Ordnance Survey. "This Place is not marked on any of our Maps" complained one Captain Scott, the Place being a part of Scotland that, on top of not appearing on maps, seemed to have different names according to whom they talked<sup>7</sup>. Scott was a Hanoverian captain writing to his commander in 1746, as they tried to control the Jacobite Rebellion. The 1707 Act of Union had already come under attack in 1715 and 1719, prompting the crown to try and take the Highland's roads in hand, in order to control the rebellious Highlanders (of 22,000 highlanders, 12,000 had been engaged in the uprisings). However, there was no such thing as 'taking the Highlands' roads in hand', as there were scarcely any roads. Only in January 1725, George Wade, under the orders of George I, started devising a plan for the control of the Scottish Highlands, through the construction of a series of forts and a functional network of roads to communicate them. The building of this infrastructural network, however, was insufficient, as the 1745 rebellion showed: the vast space in between points and lines, forts and roads, remained obscure for the eyes of the outsiders.

To illuminate these shadowed portions of the territory, David Watson (who had been Quartermaster General for the Duke of Cumberland and had fought in Culloden) proposed to his commander (and the Duke to the King) the urgent need for a complete and accurate survey of Scotland, if the United Kingdom was to pacify the land. In 1747, William Roy, a former estate surveyor, was appointed by Watson to undertake the mapping of Scotland, an enterprise by no means easy or straightforward, but that would be the seed for the Ordnance Survey of Great Britain: William Roy's trigonometric work would directly inform later, and more 'official', surveys<sup>8</sup>. Roy's scheme was to triangulate and map the whole isle of Great Britain, complemented with an internal topographical survey done by sketching<sup>9</sup>. As such, it still inhabited the world of the old county maps, but its ambition was to surpass this provinciality and provide an understanding of the whole.

Only with this view of the whole would the map materialise the unity of the state over the individuality of each cultural province. The Ordnance Survey, born following a command issued from the government, made the

territorial extension of the nation visible and available. By “mapping [...] the modern state as a single, uniform, territorial entity” it was set apart from the “multiple territories and jurisdictions of the dynastic state”:

*The (literal) delineation of boundaries and frontiers in this regime of the unequivocal, geometrical line, and the setting apart of the state from the ruler and the character of rulership, also the naturalisation of the state as (again literally) grounded in the putatively physical reality of a territory, were all aspects of a wider process involving the ‘territorialisation’ of the state, and the consolidation of what can be referred to as the ‘state country’.*<sup>10</sup>

This would be even more acute in France, where

*[t]he provinces of ancien régime France were dissolved and in their place a more ‘rational’ structure was proposed, with the intention of weakening local loyalties and homogenising regional idiosyncrasies into a single national identity. The Assembly segmented France into ever smaller subdivisions: régions, départements, cantons and communes. (...) The plan of this new ‘rational’ France looked like a cartographer’s dream: a reorganisation of the French nation according to equal geometric units.*<sup>11</sup>

Knowledge would no longer consist in piecing together little parcels of knowledge, but by producing a knowledge of the whole, making the transition “from the world of the approximate to the universe of precision”<sup>12</sup>. Based on the scientific model, the map became a self-evident proof of its own truthfulness, with the all seeing eye of the state shining upon the accurately recorded extension of the land. Michael Drayton’s approximate delimitation of the isle in alexandrines could finally have its precise bearings recorded by Roy’s triangles.

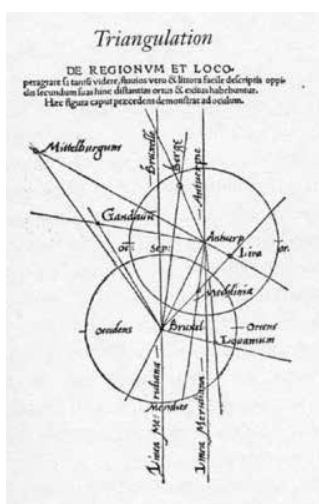
### **Relational / absolute**

Triangulation, trigonometry and new measuring apparatuses were the basis for modern map-making techniques. Their combined use replaced the approximate cartographies of antiquity. Gemma Frisius (1508) was the first to propose and systematise a way to survey the land able to overcome subjective error. In the appendix to the second edition of his *Cosmographicus iber Petri Appiani*, entitled *Libellus de Locorum describendorum ratione* (1533), Frisius gives a precise explanation of the system. It included the use of a compass for measuring angles and the selection of three high points, whose distance needed to be measured by sight, rather than by on-foot measuring<sup>13</sup>. The technique relies on trigonometric calculations, in order to assure the exactitude of the measurements – otherwise, they can be inaccurate due to distortions in the measuring elements, irregularities of the terrain, or by repeating errors from previous maps<sup>14</sup>. The first steps were to measure a straight base line, choosing a tract of land that is well-levelled to act as the base of the first triangle, then to position the angle-measuring instrument in one of the line’s ends, aiming at a prominent landmark (usually a high point, such as a church spire), and then reading the instrument to obtain the angle between the line joining landmark

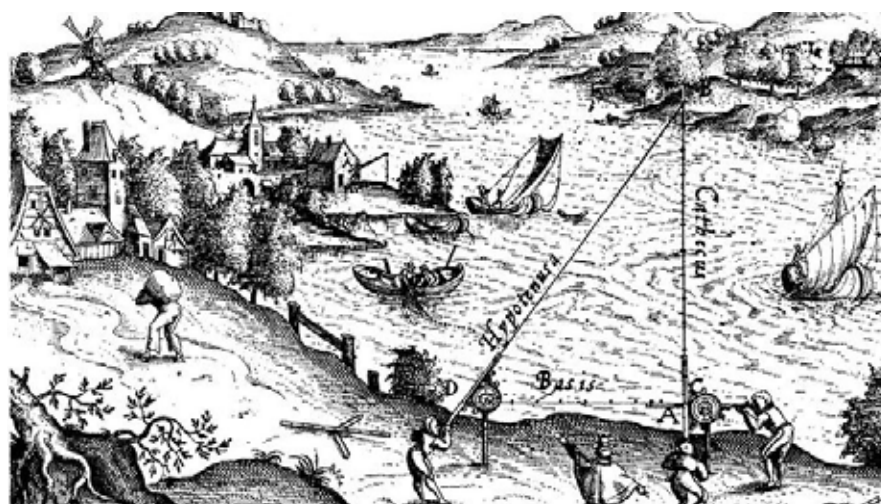
with measuring instrument and the base line. The same is repeated with the other end of the base line, aiming at the same landmark. With the measure of the base line and the two angles, the surveyor could calculate the length of the other two sides of the triangle, using the trigonometric functions. Instead of measuring by foot, with this way of surveying the irregularities of the terrain did not affect the measurements. The chains of triangles thus served as the ladder with which the relative ant's view of the surveyor became the ethereal bird's view of the intellect.

This achievement established what a map was: a scientific, accurate and true rendition of the territory, where the eye that saw the whole could record its sight in the universal language of mathematics. The eye was able to eradicate the error-inducing body, a body that from the beginnings of cartography had created mistakes. Before modernity, maps existed in, and supported, different roles and forms, as they were not “in a category separate from the writing of formal documents, painting, drawing or inscribing diagrams on a range of different media from rock to paper<sup>15</sup>.” They always had their makers inscribed in them, in mind and body. Early cosmographic maps reflected a mindset: the Sippar tablet (Babylon, 6<sup>th</sup> century BC), describes both the symbolic and mythic origins of the world, along with what seems like an abstraction of the Babylonian territory<sup>16</sup>; Anaximander’s map describes the *Oecumene* in rough geographical terms, but is more focused on “...accounting for its genesis, from the ‘boundless’ element of its origin to the appearance of humankind on earth<sup>17</sup>.”

In other kinds of maps, the body of the maker is fundamental for making sense of what is recorded: portolans were constructed by measuring the shoreline with a compass, in relation to the movement of the surveyor's ship – the eye remained at sea-level and only its movement allowed a coast to have two dimensions. As new shores were discovered, new information could be added to the yet incomplete image of the whole of the earth<sup>18</sup>. Strip maps, on the other hand, were also accumulative, as they displayed knowledge in a sequential manner. John Ogilby's *Britannia* (1675) provided with



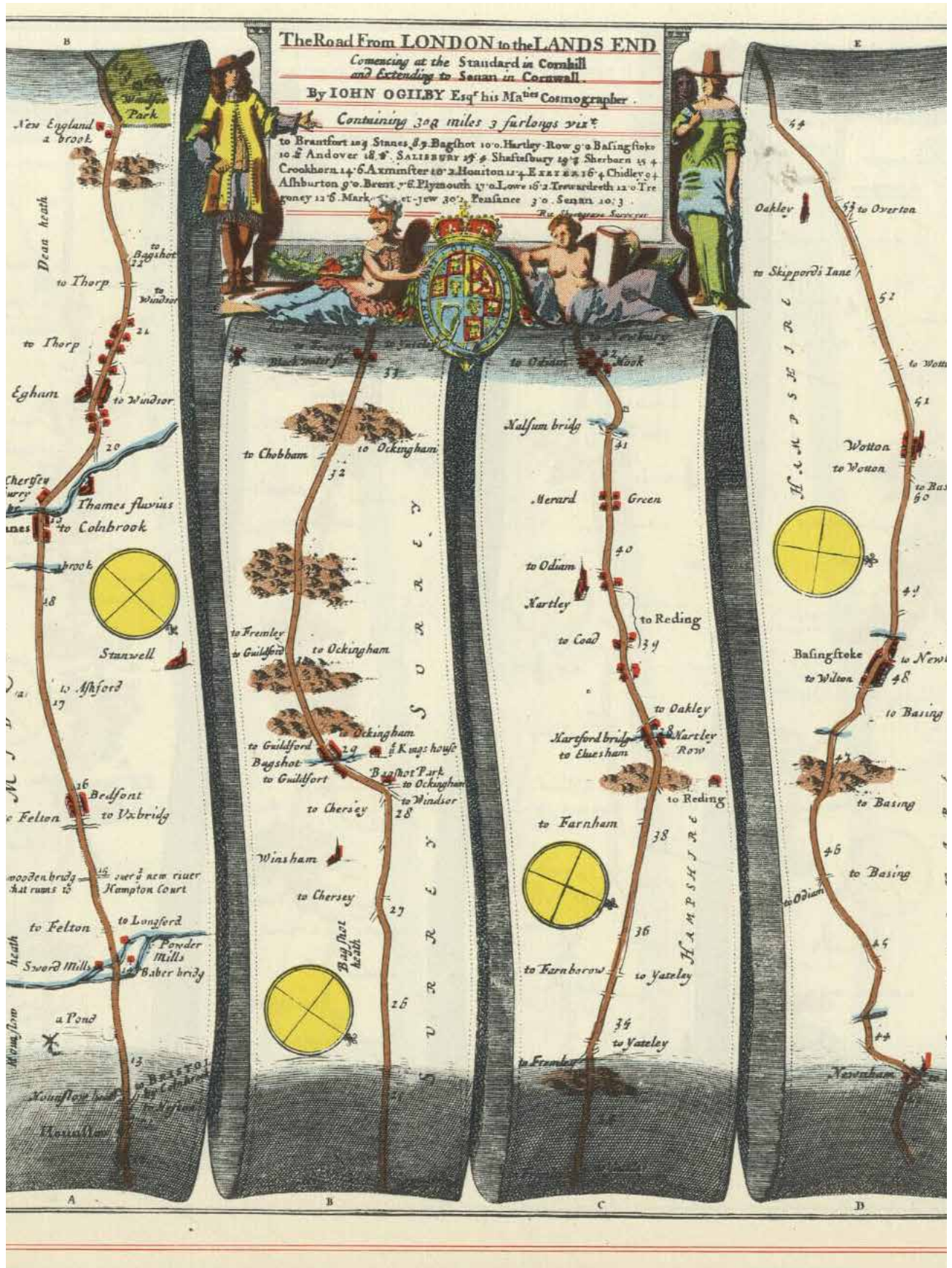
**2. Diagram introducing the idea of triangulation into the science of surveying**  
Gemma Frisius, 1533  
*Cosmographia von Petrus Apianus*



### 3. Measuring the width of a river by triangulation

Gemma Frisius, 1533  
*Cosmographia* von  
 Petrus Apianus





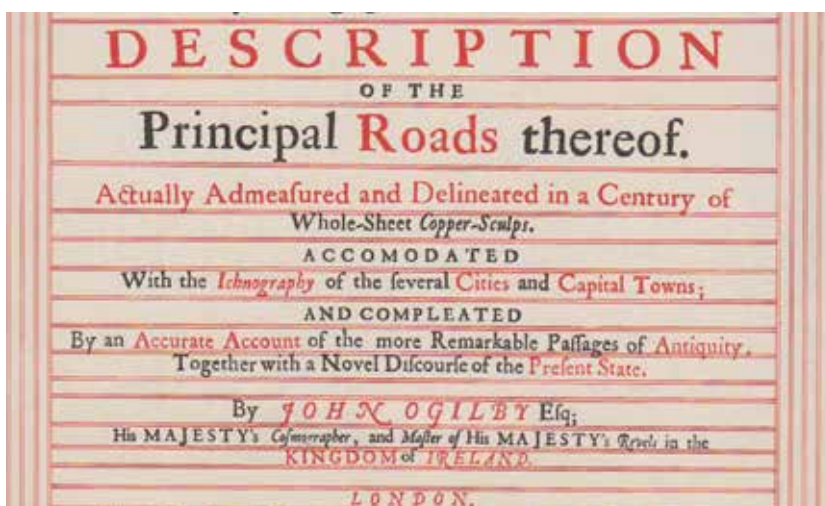
**4. Strip map**  
*The road from London to Land's End (detail)*  
 John Ogilby, *Britannia*  
 1675

*...the ACTUAL DIMENSURATION of so many Thousand Miles of Roads, through the several Counties of the Kingdom, the Protraction, Delineation, and Engravement thereof in 100 Royal Whole-Sheet Copper-Plates, the accommodating them with the Ichnographies of Capital Towns, and a Historical Discourse, wherein the more Remarkable Passages of Antiquity meet with an Accurate and Novel Illustration of the present State (...)*<sup>19</sup>

The *Britannia*'s one hundred itineraries in England and Wales "depicted each section of road at an orientation allowing the strip to be aligned vertically", while "[i]ndividual strip map sections contained information about the route relevant to carriage or horseback travel"<sup>20</sup>. Although Ogilby was particularly proud of his superior 'dimensurations'<sup>21</sup>, his *itinerarium* was bound to the corporeality of travel: the knowledge contained in the strip map only served its specific function in its specific place. The OS, as an absolute map of the whole, was free from this.

### Approximate / precise

Yet the ethereal eye of the intellect could not deal with the mess that the body had created and that still weighed on map-making. Before the British Weights and Measures Act of 1824, units of length were based on anthropomorphic qualities: feet, thumbs, distance of finger to elbow, etc., a derivation from Roman and Saxon times. They were also local, and when the Imperial Units were established, they had to be physically displayed in public places to serve as universal reference (such as Trafalgar Square, in 1876). Revolutionary France would tackle the issue in a radical way by choosing a celestial body as referent. In 1790, Charles-Maurice de Talleyrand, after a proposal from Condorcet, promoted legislation establishing a new system of measures to be derived from an eternal feature, common to all men: the earth's unchanging diameter<sup>22</sup>. The new metrical system could successfully work as a new language for commerce, science and culture, homogenising the incredibly heterogeneous array of units existing in pre-Revolutionary France. For this, a meridian would have to be measured, to find out the earth's exact size. The metric system,



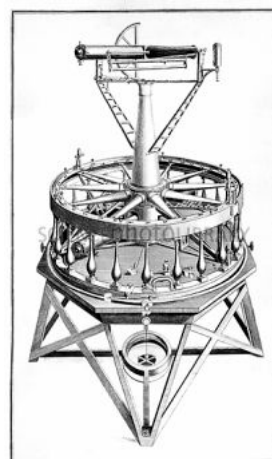
5. A linear measuring  
of Britain  
John Ogilby, *Britannia*  
1675



however, could not wait for strenuous and lengthy endeavours such as meridian-measuring: on 1 August 1793 a law was passed, unilaterally establishing the metre as one tenth-million of the distance between the Equator and the North Pole<sup>23</sup>.

Precision was the name of the language: invariable, reliable and universal. To measure accurately was not only a matter of words but also of numbers; for this, precise apparatuses were also needed. For the military survey of Scotland, Roy had used 'plain theodolites', this is, a circumferator or surveying compass (a circle with scales and a common telescope lens), and chains<sup>24</sup>. By that time, the French were using far more advanced instruments, such as the 'repeating circle', which worked "by taking multiple observations of angles on different parts of the scale and averaging these out to produce a single accurate measurement<sup>25</sup>." For the beginnings of the Ordnance Survey, however, the British were proudly using Jesse Ramsden's 'most sophisticated theodolite in the world'. Ramsden was able to produce it thanks to a series of improvements in instrument making: on the one hand, he devised a machine for engraving scales that could measure angles to one second of an arc, this is, a 3600<sup>th</sup> of a degree – which is *tiny*. On the other, this theodolite could not only measure horizontal angles (what is needed for triangulation), but also vertical ones (good for measuring heights and position regarding the stars<sup>26</sup>). Ramsden also provided the chains with which distances were measured, two one-hundred-foot steel chains that wouldn't deform (so much) under temperature changes<sup>27</sup>.

The establishment of a language of precision was possible because of the popularisation of scientific knowledge, and in this education was central. At the beginning of the eighteenth century, British engineers were still using 'impressionistic' methods of surveying: the surveyor's training was focused on the "accurate delineation of shapes on paper", on rendering colours truthfully enough – basically ornamental cartography<sup>28</sup>. This started changing with the establishment of the 'scientific corps' of the military under the Board of Ordnance, the Artillery (1716) and the Corps of Engineers (1717)<sup>29</sup>. In 1720, the Woolwich academy was established in the Tower



6. Jesse Ramsden's theodolite, in *An Account of the Trigonometrical Operation, Whereby the Distance between ... Greenwich and Paris Has Been Determined*, 1790



7. Borda's repeating circle in *Base du système métrique decimal*, Paris, 1866



of London and, here, the teachings of Clement Ladurie and others would expose the students to French and continental surveying techniques, such as Nicolas Bion's *Construction and Principal Uses of Mathematical Instruments* (first translated in 1723)<sup>30</sup>. By the second half of the eighteenth century, scientific surveying techniques were spreading and no longer exclusive to engineers, thanks to texts such as Benjamin Donn's *Mathematical Essays* (1764) and *Essay on Mathematical Geometry* (1796) and Joseph Priestley's *Perspective* (1770)<sup>31</sup>. By the end of the nineteenth century, French engineers already "admired the efficiency of the English<sup>32</sup>." New words, new measurements and the official establishment of the language of precision emancipated modern map-making from the localised body of the surveyor. In the end, there is only one Earth and its measurements are what they are.

### **Lines / surfaces**

But what are those measurements? If the metre, supposedly based on the Earth's unchanging diameter, hadn't even been measured when it was established, how would the things measured on foot (although precise in language and data) fit the other bits over the curved surface of the planet? Geodetic precision was the final step to be achieved in the quest for absolute and precise map-making, and there was no other way of reaching this than by measuring a meridian. This is no small achievement: up to then, every mapped piece of land was like an *île flottante*; knowing a meridian would allow the positioning of any single territory measured at the pedestrian level of the terrain with respect to the totality of the planet – and the universe:

*Setting a meridian is a primary act of global representation, practical in fixing absolute location and imaginative in signifying origin and ends on a turning sphere<sup>33</sup>.*

Eratosthenes (276-194 BC) had been the first to calculate the circumference of the Earth, assuming that it was round, by using the distance between Alexandria and Syene. His measure (in today's numbers, 40,074 km) was the accepted number for over 2000 years. Ptolemy, on his side, was the first to try to connect the surveyed cartographies with the bigger reality of the spheroid planet, by trying to account for the Earth's roundness in the flat surface of the paper. The major contribution of Ptolemy's *Geographia* lies not in the amount or quality of the information it conveyed, although it listed more than 8,000 positions, between cities, ports, landmarks in the *Oecumene*<sup>34</sup>, but the invention of a grid system that would allow a projection of points, taken from a three-dimensional world, onto the flat surface of a piece of paper. Eratosthenes had already used a grid system in his map, but in this case, the grid was formed by the establishment of coordinates that related the points he listed *among themselves*, whereas Ptolemy's pretended to establish absolute positions by means of his prime meridian<sup>35</sup>.

Ptolemy's meridians and grid, however, were not geodetically accurate<sup>36</sup>: distances were not trigonometrically surveyed and time difference between the two points in the meridian were not precisely calculated, as he lacked the instruments to do so.

In 1617 Willebrord Snel van Royden was the first to use triangulation between two points as a way to establish the measure of the earth, which would later inspire Cassini to pursue his own measurements. Jean-Dominique Cassini (the fourth Cassini in the Observatoire), responded to Newton's proposition that the Earth was an oblate spheroid, by measuring an arc over the period 1684–1718 (proposing that the Earth was like a lemon), and then two expeditions were sent to two different parts of the world to examine this (Peru and Lapland, in 1735), both of which demonstrated Newton's proposition<sup>37</sup>. However, only after triangulation was mastered and the chronometer invented (John Harrison invented the first Sea Clock, H1 in 1730–1736, and the first Sea Watch, H4 in 1756–1761), real meridian measuring began<sup>38</sup>.

This was a scientific endeavour that brought together French and British cartography. The Ordnance Survey had been in need of a meridian, ever since Roy had asked for a triangulation of the whole island in 1766, to no avail. By that time, every mapping nation had their own meridians, most notably, the French had the Paris meridian and the British, Greenwich. The problem was that there were disagreements between the relative positions of the two Royal Observatories through which the meridians passed – a fundamental problem, for they were what would render cartography geodetically true. The difference, 11 seconds for longitude and 15 in latitude, prompted Cassini de Thury to propose a link between the two observatories, by means of triangulation<sup>39</sup>. Roy, who received Cassini's memoir from friends at the Royal Society, saw this as the opportunity to start the triangulation of Great Britain on the right foot, and so it turned out that the first activity of the British trigonometric survey was the connection with the French. On the other side, Pierre-François-André Méchain was commissioned



**8. Encounter of the expeditions**  
in *Philosophical Transactions of the Royal Society of London* vol 80: 111–254, 1790

by the French Royal Academy of Sciences to form part of a Franco-British expedition to survey the difference in longitude between the Paris and Greenwich meridians. On 24 June 1784, the expedition was approved by the Royal Society.

Hounslow Heath was where the base of the first triangle for the trigonometric survey of Great Britain was traced, surveyed and measured. It was also *the* place to be: “Hounslow Heath in the summer of 1784 almost took on the air of a scientific carnival<sup>40</sup>”: notable scientists, members of the Royal Society, and even the King visited the site, to witness the commencement of the measurements. After establishing the base of the triangulation, the English met the French (who in turn were also measuring the Earth to find out what a metre was), both branches lightly touching with their instruments, eyesights and carefully plotted lines over the English Channel – or the Canal de La Manche, depending from which side you are coming. These measurements allowed the relative position of the two observatories to be asserted and so the floating island was precisely pinpointed to the earth’s surface. As a result of the later success of the French in measuring the diameter of the Earth<sup>41</sup>, complete geodetic knowledge was finally achieved. After this, partial knowledge of separate territories could at last be put into a systematic knowledge of the whole.

### **Difference / sameness**

The earth, however, is not just a surface. As Pherecydes’ *Theogony* puts it, at the beginnings of time, there were Zas (the ruler of gods, later Zeus), Chthoniê and Chronos. Then Zas marries Chthoniê, and this is the moment when the earth, as both surface *and* matter, originates. At their wedding, Zas covers Chthoniê (*chthonios* means in, under or beneath; can be therefore understood as underworld) with a robe weaved of land and oceans, thus creating the earth, Gê (which means land). This mythical first marriage allows for the planet, formerly just unaccountable matter, to be looked at and described as earth: the beautiful robe bestows a lacework of land, sea, mountains, rivers, clouds and rain that can be represented<sup>42</sup>. It is the robe that makes the earth visible and only when Chthoniê is dressed, can Gê be undressed. Enlightened cartography, for all its myth-busting science, performed the same action: it couldn’t stop at the earth’s surfaces but continued deep into the planet’s matter.

Knowledge of the territory was then not just the awareness of its appearance, of its topography, but most of all, of what it could produce. Both by exploiting its surface, through agriculture, and its matter, through mining<sup>43</sup>, the land became a material source of wealth that had to be exploited in a systematic fashion<sup>44</sup>. For this, the French produced the perfect professional, the engineer, who when surveying the territory not only captured its present state, but also saw its possibilities in the future. The modifications engineers devised were directly related to improving the land’s capacity to yield wealth: the territory could be “moulded to man’s advantage”<sup>45</sup>. The map was the repository of all the elements

found in the territory, a kind of catalogue of the productive countryside<sup>46</sup> and, at the same time, provided the means through which that wealth could be put into circulation:

*Once a territory had been accurately surveyed, it was possible to plan routes in an entirely new fashion: the possibility arose of plotting a prospective road on a premade map of the territory rather than engaging in road sightings as the laborers moved across the landscape. Where the ant's eye of sighting took in only the nearest possible vantages, the bird's eye of plotting made possible an actual determination of the most even route.*<sup>47</sup>

The territory, under the engineers' eye, needed planning<sup>48</sup>:

*(...) [W]ealth had to be set in motion [...] and Quesnay, in his famous Tableau économique (1758), written a year after his article 'Grain' in the Encyclopédie, had laid the basis for an economic analysis in terms of flows. Works devoted to the circulation of wheat proliferated. (...) It was because the land produced harvests that it subsequently gave rise to the notion of planning.*<sup>49</sup>

The representation of a territory's present and potential futures in the map not only made them central to the production of the territory but also for its subsequent consumption<sup>50</sup>.

The map that had overcome the human eye's insufficiency provided with the knowledge that would permit dominance over nature, as the formerly great unknown, the earth, could be exploited, administered, and even perfected. The actions of the engineers, the exploiting and building, of course changed the territory. If the map recorded difference ("a difference in altitude, a difference in vegetation, a difference in population structure, difference in surface, or whatever<sup>51</sup>"), the engineers' actions imposed a new kind of sameness. Roads, bridges and tunnels evened out relief and re-distributed people; exploitative practices made every corner accountable for and regularised surfaces; scaled drawings reshuffled cultural limits. The language of the engineer was no longer of geometry alone, but also of economics, as the territory ceased to be just a spatial category, to become also a temporal one: "[i]t was no longer space in the strict sense which mattered, but its relationship with time, with the time of exchange, transportation, the circulation of commodities, flows of every kind, the time of the mortgaging of services, of the calculation of their profitability, and the limitless timescale of progress<sup>52</sup>."

The mathematical description of the land made the map not just a representation, but a working model – in consequence, the territory could not only be moulded but also modelled. The eighteenth and nineteenth century saw the surface of England change, as

*...the immemorial landscape of the open fields, with their complex pattern of narrow strips, their winding green balks of cart-roads, their headlands and grassy footpaths [changed] into the modern chequer-board pattern of small, squarish fields, enclosed by hedgerows of hawthorn, with new roads running more or less straight and wide across the parish in all directions*<sup>53</sup>.

Enclosure, although started in the XVI century, only summoned momentum between 1750 and 1850<sup>54</sup>, and both act and map were central for the construction of the landscape of modernity<sup>55</sup>. Nature started following the designs not of the gods, but of the map, resulting in a deep re-fashioning of Gè/Chthoniè's robe and body. The robe would no longer be a handcrafted weaving, but rather a regular, homogeneous pattern – probably the doing of Chronos, the third wheel in the original myth and now a central character.

### City / metropolis

Modern map-making encountered a problem when it came to the city. It was a problem that had been there from the early Renaissance, when Ptolemy's *Geographia* was re-discovered and introduced into Europe<sup>56</sup>. The Renaissance city fitted perfectly with Ptolemy's definition of chorography's subject:

*[t]he end of chorography is to deal separately with a part of the whole, as if one were to paint only the eye or the ear by itself. The task of geography is to survey the whole as one would the entire head. (...) Chorography is most concerned with what kind of places those are which it describes, not how large they are in extent. Its concern is to paint a true likeness, and not merely to give exact position and size.*<sup>57</sup>

The Renaissance city was the evident eye or ear, as it often stood walled-up as a distinctive unit in the middle of the territory, and so chorography could help celebrate the centres of the developing Renaissance world by capturing them and making them available to the public. Yet the means through which they were to be depicted was where the confusion lay: if geography was the product of calculations and mathematical abstraction and was expressed through geometrical drawing, chorography, the product of a vision-based observation, was expressed through painterly drawing. The confusion, however, arose within the translation of Ptolemy's text, from ancient Greek to sixteenth-century Italian, by way of Latin. In this process, the idea that Ptolemy was also propagating a connection between geography and painting spread<sup>58</sup>. This crossover between the sensual and the abstract was problematic because it interfered with the clear boundaries thought to exist between geography and



9. The head, *Geographia*, in *Cosmographia* von Petrus Apianus, 1533



10. The eye and the ear, *Chorographia*, *Cosmographia* von Petrus Apianus, 1533



11. Map of Imola,  
Leonardo da Vinci, 1502,  
Royal Collection

12. Coastal view of  
Moguntia,  
Georg Braun & Franz  
Hogenberg, 1575





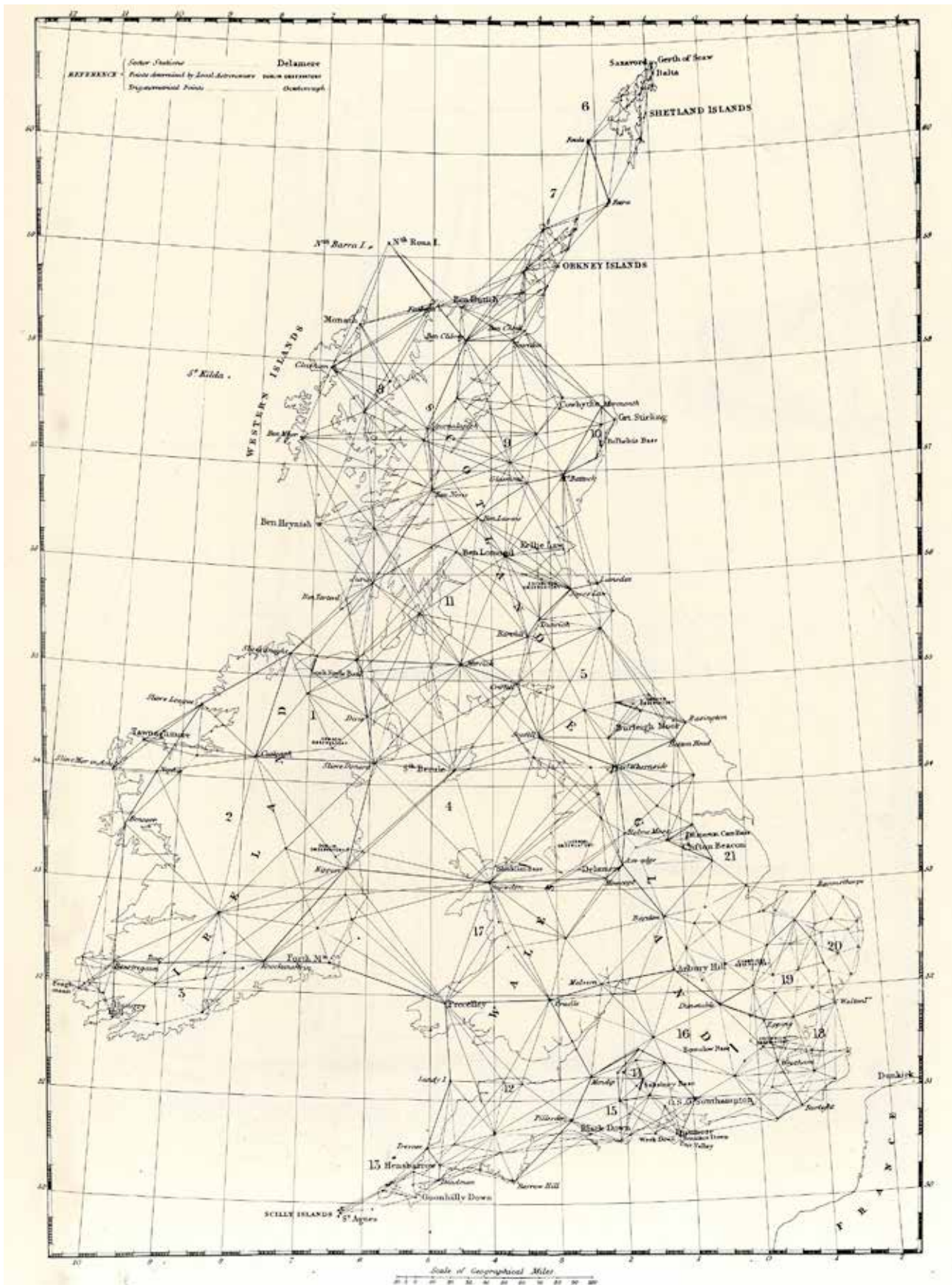
chorography. To muddle up things more, the ‘true likeness’ dictum of chorography imposed precision to a depiction that had also to be concerned with quality and character<sup>59</sup>. On top of that, the individual units that aggregated and conformed the city spoke a mathematical language, as established by Alberti and propagated by Raphael. Alberti’s statement that “[h]uman intellect is held to be the addressee of the architect’s drawings, not the human eye” evicted from architectural drawing any attempt to capture the sensuous – colour, light, and character, this is, the realm of painting.

Confusion turned out to be productive, as it pressed Renaissance chorographers towards innovation: Leonardo da Vinci’s map of Imola (1502) is an orthogonal view from above in evocative colours while displaying the remnants of calculation<sup>60</sup>; Jacopo de Barbari’s map of Venice (1500) invents the perspective plan and renders each building in precise detail over a distorted and adjusted city<sup>61</sup>; Cornelis Anthonisz’s or Gaspar Honje’s coastal views (1558 and 1583 respectively) show the land in profile, as seen from the sea<sup>62</sup>; the panorama developed the idea of the profile view, adding perspective to what lay behind the foreground and also inventing a way to be displayed; Jacob de Gheyn’s view of Schiedam (1598) combined different views, perspective plan and profile, in a composite rendition of the city<sup>63</sup>.

Rather than depending on their graphic methods or in the portrayed subject, the real difference between these works and geography is in the relation between the surveyor’s position and the capturing of his vision. The geographic map, from Ptolemy to the enlightened engineer onwards, is about the dissolution of the maker’s presence, by dissolving his position through orthogonal projection and by toning down his graphic language into an objective average. In chorographic images, on the contrary, the resulting product is all about giving the surveyor a place *within* the image and to reproduce his vision as he subjectively sees it. Because of this, the surveyor hovers over Imola close enough so as to see the colours of the roofs or the pebbles in the riverbed, Venice can be seen as birds would, without losing any detail, and coasts appear as they do to the seamen navigating the Northern seas. Renaissance chorography thus combined the capturing of both apparent surface and underlying structure at the same time, through painting *and* geometry. The resulting images may be mimetic or abstract, but all of them persuade the viewer that they have been taken from life by ostentatiously displaying their familiarity with the city’s details. Furthermore, the assertion of a position, such as the panorama’s centrality, stands as a token of lifelikeness, of closeness with the portrayed subject.

The modern city, on the contrary, could not be seized by a commanding view from outside, nor be measured on foot and then rendered in detail. If the Renaissance city was a walled unit, the metropolis was an expanding environment; if chorography was about capturing and celebrating a city’s distinctiveness, the complexity and sheer difference contained in the modern metropolis was not reducible to one view. The observer of the metropolis was inside, and so a decision had to be made: its representations had either to accept their insufficiency and concentrate on detail, or adopt the view of the whole and lose it completely.





14. Principal triangulation  
of Great Britain  
Henry James and Alexander  
Ross Clarke, 1858, Ordnance  
Survey Map Office

**Outside / inside**

The Hounslow Heath moment (a ‘moment’ that lasted the seven years it took to make the French and British observatories enter into agreement) was the founding event of modern map-making in Britain. From then, the surveyors rolled over the countryside, sighting, measuring and recording. The Principal Triangulation of Great Britain took seventy years (1783-1853), and the first map published by the Ordnance Survey was Kent in 1801, in a scale of one inch to the mile (1:63,360). By 1810, almost all the south of England had been recorded in this scale and the resulting maps were already leaving county limits behind and favouring the continuous display of the territory, thus letting go of provincial identities. In 1841, the OS started the “County Series”, a survey that provided more detail into inhabited areas, giving preference to the six inches to the mile scale, but also to the very metric 1:2,500 – which gives a strange 25.344 inches to the mile in Imperial units. The six inches map covered a six by four miles extension and showed mainly counties, whereas the twenty-five, one of more or less one acre and displayed parishes. By the 1890s, both series were completed<sup>64</sup>.

All went relatively smoothly, until surveyors reached the metropolis. In 1847 the Metropolitan Sanitary Commission requested the Ordnance Survey to do a map of London for their sewers projects, the maps were made at a scale of five feet to the mile. However, in 1848 already the recently formed Board of Health reckoned that such scale was too small for their requirements, and so proposed a survey to be done at ten feet to the mile. Others joined, even proposing a re-mapping of the entire country at a scale of 26 2/3 inches to the mile<sup>65</sup>. It wasn’t evident what was the scale with which the map should approach urban territory, as its salient features (the much sought-after ‘differences’) were either too small or too much alike: buildings constitute the topography of the city, yet they escape the map’s sight; infrastructure, the spreading of the engineer’s actions, homogenises the territory. The resulting ‘Skeleton Plan of London’ shows only the limits of the street, without showing building profiles or even plot lines, the only detail being the levels of the streets, as this survey was done for waterworks<sup>66</sup>. This skeletal view of the urban is therefore in direct opposition to the full-fleshed one of the countryside – and it might be that that’s just how things are meant to be:

*‘Country’, as a word, is derived from contra (against, opposite) and has the original sense of land spread out over against the observer. In the thirteenth century it acquired its modern meanings of a tract or region, and of a land or nation. In [William] Tindale in 1526 it is contrasted with the city: ‘tolde it in the cyte, and in the countre’ (Mark v, 14). (...) From the late sixteenth century (...), there are more frequent and more pointed contrasts of ‘city’ and ‘country’. (...) ‘Countryside’ is an eighteenth- to nineteenth-century development, in its modern sense<sup>67</sup>.*

Perhaps the map was supposed to stay outside the city, as the view it offered was too abstract and reductive for nineteenth-century London. By that time, London

overflowed with representations, as it prompted “concern and comment” from people such as clergymen, doctors, ‘publicists’, journalists, novelists, economists, architects, city planners and historians<sup>68</sup>. These productions, a response to a city life often in tension with an idealised, past, rural one, at the same time describe the city and depend on it<sup>69</sup>. Modern city life not only assured the production of ideas (through the cultural, scientific and educational institutions that cities hosted), but also its incessant reproduction: “better roads and more newspapers<sup>70</sup>” were central for both its physical growth and the increase of its value.

The city could no longer be looked at as a topography (its surfaces), but had to be examined in an anatomical way (its interiors). This change of view drew upon the advances in the sciences to allow the city to be diagnosed and potentially healed<sup>71</sup>. Even if the anatomical sight was more of a trope than an actual operative tool, the knowledge that the city produced about itself, and that informed the knowledge of its inhabitants, abandoned the surface and tried to make sense of what is within<sup>72</sup>. The importance of cultural and social codes attached to material things became central to understanding the workings of city life<sup>73</sup>. The spotting of differences, *social* differences, became a fundamental tool:

*...the urban detective [as Sherlock Holmes], prefigured in a minor way in Dickens and Wilkie Collins, now begins to emerge as a significant and ratifying figure: the man who can (...) penetrate the intricacies of the streets. [T]his eccentric sharp mind, this almost disembodied but locally furnished intelligence, which can unravel complexity, determine local agency, and then, because there the inquiry stops, hand the matter over to the police and the courts: the clear abstract system beyond all the bustle and the fog.<sup>74</sup>*

### **Territory / people**

The need to understand London elicited careful observation that paired the topographical with the anatomical view, in an attempt to make sense of it in a productive way: “[p]articularly in Britain and France, the early nineteenth century saw the eclipse of an older ‘political arithmetic’ by what was increasingly to become modern statistics<sup>75</sup>.” The same distance that enlightened map-making imposed between surveyor and territory, and that codified the observed into a rational, objective, system of representation, was applied into the observations of the ‘social’ – a category being developed as it was studied, just as landscape had been defined by surveying. The statistical view of the nineteenth century managed to make visible autonomous subjects, in place of estates or other forms of property-bound identities<sup>76</sup>. This visibility, however, was necessarily reductive: instead of privileging difference, the statistical view relies on commonalities – a generalisation and standardisation that allowed the observer to remain objective. From this moment on, poor areas of London that until then had been “described as ‘unknown’ and ‘unexplored’<sup>77</sup>” such as the East End, came to the centre of emerging ‘social’ studies<sup>78</sup>. The language of these observations was indeed mathematical and the observer consciously fabricated a distanced point of view, just as with mapping:



15. Skeleton Plan of London  
5 feet to the mile,  
Ordnance Survey, 1848-  
1850, British Library

16. Skeleton Plan of London  
12 inches to the mile,  
Ordnance Survey, 1848-  
1850, British Library

*[Charles] Booth's deliberate impersonality – mapping and grading before visiting; systematic tabulation – is less readable and less attractive [than other accounts of the East End, such as Henry Mayhew's], but it belongs to a way of seeing which the new society itself was producing: that empirical version of the sociological imagination which was to be developed by Rowntree, by the Webbs and by social investigators of our own time.*<sup>79</sup>

Mathematical distance, the scientific observation of the social, allowed for planning and, paired with mapping, “enabled the coordination of incredibly complex systems like states<sup>80</sup>”. The distance afforded by the mathematical view of both territory and people is the key to the liberal government that Britain would become, which translated in a neutral, matter-of-fact, disinterested way of ruling, with a clear distinction between state and society – and a clear accountability of the former to the latter<sup>81</sup>.

Mathematical records, in the form of maps or statistics, resolved at least one of the problems of representing the city. They constructed a fairly complete model of the whole, absolute in their certainty and truthful as they complied with the conventions of scientific knowledge. The map and the plan became the official language of the territory, rural and urban, and if a claim was made outside of this language, it was dismissed<sup>82</sup>. This paperbound model city allowed for planning (tinkering with the figures beforehand), and gave command not only over what was already there, but also its present and future. Just as the landscape could be improved by engineering, the ‘social’, as far as its problems were known, could also be reformed. They are both the materialisation of the Enlightenment and most faithful servants of its principles. The outcome of mathematical precision, they are Galileo Galilei’s dictum made physical: “the book of nature is written in geometrical characters”. In the nineteenth century, nature encompassed *human* nature as well, also to be described by numbers. The mathematical model materialises the replacement of Aristotelian physics by that of Galileo, Newton, Laplace: “to substitute for the real, experienced world a world of geometry made real, and to explain the real by the impossible<sup>83</sup>” – this is, that the physical is treated as mathematics, or as Koyré puts it, choosing to “think with Galileo, [rather than] to imagine with common sense<sup>84</sup>.” Experiments replace experience, and so both land and people can be known through drawings and numbers.

#### **And / or**

But this was in the far distance of mathematical space. Down there in London, things were moving fast: just as the detached, commanding, view of the whole achieved by maps and charts were perfected, speed, commuting and the possibility of quick long-distance journeys radically changed the relation of people to the city – indeed, to space and time in general. The transport revolution signalled by the railway, the car and the underground in the nineteenth and twentieth century brought movement



into the territory. From the slow migration from countryside to urban centres that made the city a metropolis, to the daily commute that sustained its production, movement was now a defining element of modern life. If maps and statistics were offering a truthful rendering of the metropolis, this was of little help to the individual on foot, not only because their language appealed only to the specialist, but because they were so removed from everyday life. The map, recording the permanent and unchanging aspects of the territory and presenting an eternal moment, and statistics, favouring recurrences over accidents and giving a timeless understanding of it, were both utterly insufficient to the needs of the moving metropolis.

Accompanying the change brought on by the transport technologies, a large amount of popular maps, guides, signs and diagrams spontaneously appeared, based on information but adapted to everyday use. These manuals (for they are usually to be kept at hand), in their *raison d'être*, go over distinctions between knowledge of whole or part, of relations or absolutes, of approximates or precisions, of surfaces or structures: they are no more about the 'or', but about the 'and'. In this sense, they relate more to the communication conundrums of Renaissance chorography rather than to the geographer's problems of 'objectivity', for in their aim to bridge the view from above with an everyday use of the city, they needed to invent new ways of capturing it. For this, they abandoned the pure language of mathematics and go back to that other and/or, the one presented by the *graphein* – drawing and writing at the same time. They do so in order to grasp the elusiveness of movement and to relay it to the subject, who needs it not for some elevated sense of Knowledge or policy, but for the pedestrian issue of knowing where she or he is.

These manuals have the task of managing movement: they are orientation devices that no longer have the mandate to know where everything is, as the map did, but to administer people, space and time. They do so by crossing over another gap: if the map is a description, these manuals are both a description *and* a prescription. They guide a way ahead, as they instruct a way to use the city; they are both a representation of London and a working apparatus. The immediate need for moving about makes them occupy all the spaces between built matter and the subjects' flesh – their *graphein* finds its way to pockets, interiors and roads. This colonisation of everyday life allows them to bring about a non-orchestrated change in the way of seeing by the metropolitan subject: if the Survey gave specialists the view from above, these manuals depart from it but end up installing their own particular view, one that has more to do with *surveiller* than with surveying, one that rather than seeing from above, oversees. They are the ephemeral, banal, everyday matter that organises the metropolis, yet their detachment from any programmatic mandate makes them both symptom and cause. They offer a view of London, of modern orientation and of the possibilities of the graphic in capturing and relaying space, time and movement; a view from, into and of the metropolis.

- 1 Richard Holmes, *The Age of Wonder: How the Romantic Generation Discovered the Beauty and Terror of Science* (New York: Pantheon Books, 2009), 126–127.
- 2 Ibid., 159.
- 3 Harley, J. B.: “The Origins of the Ordnance Survey”, in W. A. Seymour, ed., *A History of the Ordnance Survey* (Folkestone: Dawson, 1980), 9.
- 4 Ibid., 7.
- 5 See Michael Drayton and Richard Hooper, *The Complete Works of Michael Drayton* (London: J. Russell Smith, 1876). For a contemporary assessment of the work, see The Poly-Olbion Project, University of Exeter: <http://poly-olbion.exeter.ac.uk/>
- 6 See Alex C. Purves, *Space and Time in Ancient Greek Narrative* (New York: Cambridge University Press, 2010).
- 7 Rachel Hewitt, *Map of a Nation: A Biography of the Ordnance Survey* (London: Granta, 2010), xviii.
- 8 Ibid., 17.
- 9 “The [trigonometric] survey was evidently based on a series of compass traverses with some of the features away from the traverse lines fixed by intersecting compass bearings. The remaining detail, including the relief, had necessarily to be sketched by eye.” Various authors: “Early Methods of Topographical Survey”, in Seymour, *A History of the Ordnance Survey*, 57.
- 10 Patrick Joyce, *The Rule of Freedom: Liberalism and the Modern City* (London: Verso, 2003), 38–39.
- 11 Hewitt, *Map of a Nation*, 106.
- 12 Antoine Picon, *French architects and engineers in the Age of Enlightenment* (Cambridge: Cambridge University Press, 2009), 312. citing Alexandre Koyré’s essay title, in *Études d’histoire de la pensée scientifique*.
- 13 Pouls, H.C.: “Mieux vaut voir que courir 2” in Centre Pompidou, ed., *Cartes et figures de la terre* (Paris: Centre Georges Pompidou, 1980).
- 14 “[I]n the common method of plotting by scale and protractor, any inaccuracy in a former line is *naturally communicated* to all succeeding lines.” Jo Guldi, *Roads to Power Britain Invents the Infrastructure State* (Cambridge, Mass.: Harvard University Press, 2012), 35.
- 15 Jerry Brotton, *A History of the World in Twelve Maps* (London: Penguin Books, 2013), 5.
- 16 Ibid., 2.
- 17 Jacob, Christian: “Mapping the Mind: The Earth from Ancient Alexandria”, in Denis E. Cosgrove, ed., *Mappings* (London: Reaktion Books, 2002)
- 18 For more on this kind of maps, especially Portuguese portolans, see ch. 2 “An Empire Built on Water: The Cartography of the Early Portuguese Discoveries” in Jerry Brotton, *Trading Territories: Mapping the Early Modern World*, 2013.
- 19 John Ogilby, *BRITANNIA Volume The First Or an Illustration of the Kingdom of England and Dominion of Wales: By a Geographical and Historical Description of the Principal Roads Thereof*, reprint (London: Alexander Duckham & Co, 1939), 5.
- 20 Alan M. MacEachren, “A Linear View of the World: Strip Maps as a Unique Form of Cartographic Representation,” *The American Cartographer* 13, no. 1 (1986).
- 21 And is recorded as the one who introduced the statute mile of 1,760 yards over the Gallic-indebted 2,428 yards mile. Herbert George Fordham, *John Ogilby (1600-1676) His Britannia and the British Itineraries of the Eighteenth Century* (London: Oxford university Press, 1925), 157–158.
- 22 Ken Alder, *The Measure of All Things: The Seven-Year Odyssey and Hidden Error That Transformed the World* (New York: Free Press, 2003), 90.
- 23 Ibid., 105.
- 24 Seymour et al: “Early Methods of Topographical Survey”, in Seymour, *A History of the Ordnance Survey*, 57.
- 25 Hewitt, *Map of a Nation*, 78.
- 26 Ibid., 79–82.
- 27 Papworth, K. M.: “The Geodesy of Roy, Mudge and Kater 1784-1823” in Seymour, *A History of the Ordnance Survey*, 36.
- 28 Guldi, *Roads to Power Britain Invents the Infrastructure State*, 32–33.
- 29 Harley, J. B.: “The Origins of the Ordnance Survey”, in Seymour, *A History of the Ordnance Survey*, 3. The Board of Ordnance existed since the middle ages, and by the time of Henry VIII was mostly concerned with fortification and defence – this is, engineering as building. In 1863 it was reorganised and its engineering capacities started being rationalised. In 1716-1717 the scientific aspect of engineering became clearer.
- 30 Guldi, *Roads to Power Britain Invents the Infrastructure State*, 33.
- 31 Ibid., 34–35.
- 32 Picon, *French architects and engineers in the Age of Enlightenment*, 332.
- 33 Denis Cosgrove, *Apollo’s Eye: A Cartographic Genealogy of the Earth in the Western Imagination*, Paperbacks ed (Baltimore: Johns Hopkins Univ. Press, 2003), 183.
- 34 Jacob, Christian: “Mapping the Mind: The Earth from Ancient Alexandria”, in Cosgrove, *Mappings*, 40.
- 35 “[Eratosthenes’] ...map relied on a set of notable points, each defining its unique meridian and parallel. These lines were not organized into a systematic grid, and the aim of the map was not to locate points, but to organize a space of *summetria* (commensurability), wherein measured intervals (*diastēmata*) would build up a frame of non-regular perpendicular lines. (...) Eratosthenes’ purpose was thus to build a structure of abstract geometrical lines and shapes which did not represent anything real in the geographical space but made visible mathematical [Euclidean] relationships within the orthogonal frame of the map.” Ibid.

36 They "...are themselves products of mapping, the result of a shift from the relative position of places to their absolute positions, once a grid of numbered parallels and meridians has been drawn in cartographic space." Ibid.

37 Alder, *The Measure of All Things*, 97–98.

38 Cosgrove, *Apollo's Eye*, 182–187. Until the invention of Harrison's clocks, longitude was determined at best either by pendulum measurement or by the reliance on celestial charts of fixed stars, the main producer of which was the Greenwich Observatory (especially under the directorship of Edmund Halley) – the main reason why the Greenwich meridian gained so much importance and keeps it until today.

39 Harley, J. B.: "The Origins of the Ordnance Survey", in Seymour, *A History of the Ordnance Survey*, 14.

40 Ibid., 15.

41 The measurement of a meridian for the establishment of the metre was carried out by Jean-Baptiste-Joseph Delambre and Pierre-François-André Méchain in the 1790s between Barcelona and Dunkirk. They walked towards each other, constructing a chain of triangles to finally meet in Rodez. After this, and using the recently invented chronometer, they were able to accurately calculate the length of the arc, and therefore the exact diameter of the Earth – close to exact, if one is to be accurate. The first official metre was forged in Paris in the 1880s by the Conservatoire National des Arts et Métiers. a metal alloy of 90% platinum and 10% iridium at 0°C, and was kept in the Pavillon de Breteuil in Paris. Since 1983, the metre is defined as the length of the path travelled by light in vacuum during a time interval of 1/299,792,458 of a second. Alder, *The Measure of All Things*.

42 Purves, *Space and Time in Ancient Greek Narrative*, 100–108.

43 Picon, *French architects and engineers in the Age of Enlightenment*, 244.

44 "The importance of the engineers of the Ponts et Chaussées is directly linked to the birth of the modern concept of landscape and to the definition of a roads policy, which was becoming one of the state's chief priorities." Ibid., 100. Others would argue that the invention of landscape is Venetian rather than French: see "Venice, the Veneto and Sixteenth-century landscape" in Denis E. Cosgrove, *Social Formation and Symbolic Landscape* (Madison, Wis.: Univ. of Wisconsin Press, 1998).

45 Picon, *French architects and engineers in the Age of Enlightenment*, 225.

46 Ibid., 244.

47 Guldi, *Roads to Power Britain Invents the Infrastructure State*, 36–37.

48 Alessandra Ponte, *The House of Light and Entropy*, Architecture Words 11 (London: Architectural Association, 2014), 176. Ponte refers specifically to the ENPC's competition *plans* rather than the results of surveying.

49 Picon, *French architects and engineers in the Age of Enlightenment*, 243.

50 Ponte, *The House of Light and Entropy*, 176 and 208.

51 Ibid., 202. citing Gregory Bateson "Form, Substance and Difference", *Steps to an Ecology of Mind* (Chicago: University Press of Chicago, 2000; first edition 1972), 454–471.

52 Picon, *French architects and engineers in the Age of Enlightenment*, 332–333.

53 William George Hoskins, *The Making of the English Landscape*, 2. impression (London: Hodder and Stoughton, 1973), 179.

54 Ibid., 185.

55 As Hoskins notes: "A map always accompanied the award originally", although the historian would not always find the map together with the award: for "102 awards, [there are] only 20 maps, a fairly typical state of affairs". Ibid., 186.

56 See Lucia Nuti "Mapping places: Chorography and Vision in the

Renaissance" in Cosgrove, *Mappings*, 90.

57 Ptolemy and Edward Luther Stevenson, *The Geography* (Dover Publications, 1992), 25–26.

58 Nuti: "Mapping places...", in Cosgrove, *Mappings*, 90. According to Nuti, "[t]he incorrect reading of the opening phrase, 'È geographia mimesis esti diagraphè' instead of 'mimesis diagraphè', in its Latin translation 'imitatio picturae', was used by Peter Apian and Wilibald Pirckheimer, and was more widespread than the initial, correct translation by Jacopo d'Angelo: 'Cosmographia designatrix imitatio totius cogniti orbis.' It suggested that Ptolemy himself wanted to establish some kind of relationship between the two disciplines. The unclear and ambiguous expression, in open contradiction to the subsequent text, raised interpretation problems for Ptolemy's Italian editors. In Italian it became 'imitazione di dipintura', or 'imitazione del disegno'. Agrippa of Nettesheim rendered it into English, describing the geographical chart as 'a certaine imitation of painting'."

59 Lucia Nuti, "The Perspective Plan in the Sixteenth Century: The Invention of a Representational Language," *Art Bulletin* 76, no. 1 (1994): 108.

60 Jessica Maier, *Rome Measured and Imagined: Early Modern Maps of the Eternal City* (Chicago: The University of Chicago Press, 2015), 29. For an interpretation of Leonardo's circle see also Nuti: "Mapping places..." in Cosgrove, *Mappings*, 92–93. Although Leonardo's map of Imola is considered the first ichnographic image of a city (see John A. Pinto "blablabla"), I consider it chorographic because it is clearly painterly - moving away from Alberti's recommendations and what would later be promoted by Raphael. That it is done with calculations does not make it *not* chorographic, as precision was also a mandate for chorography.

61 Maier, *Rome Measured and Imagined*, 9–10. The perspective plan is the particular



Italian response to the problem of total vision of the city. Nuti: "Mapping places..." in Cosgrove, *Mappings*, 98.

62 Nuti, "The Perspective Plan in the Sixteenth Century: The Invention of a Representational Language," 109–110. The profile view is, for Nuti, the Northern response to the need for a lifelike rendition of the city.

63 Nuti, "Mapping places..." in Cosgrove, *Mappings*, 104–105.

64 A number of revisions followed until, after WWII, the Ordnance Survey National Grid, in scales of 1:1250, 1:2500 and the old 1:10,560, replaced the County Series. In 1995, the Ordnance Survey was the first national institution in the world to digitise all its maps.

65 Hewitt, *Map of a Nation*, 297–298.

66 Peter Barber et al., *London: A History in Maps* (London: The London Topographical Society in association with the British Library, 2012), 252–253.

67 Raymond Williams, *The Country and the City* (London: Chatto & Windus, 1973), 307.

68 Andrew Lees, *Cities Perceived: Urban Society in European and American Thought, 1820–1940* (Manchester: Manchester University Press, 1985), 10.

69 "Journalists, publicists, and other authors of works of social description depended heavily upon urban newspapers, magazines, and publishers to print their essays and books, and they depended equally upon the urban middle class to buy and read them." Ibid., 33.

70 Ibid., 46.

71 Ibid., 18. "At the same time, a fundamental transformation was occurring in medical science itself. Physicians no longer regarded disease as 'a bundle of characters disseminated here and there over the surface of the body' but instead as 'a set of forms and deformations, figures and accidents and of displaced, destroyed or modified elements bound together in sequences according to a geography that can

be followed step by step.' This change from a topographical to an anatomical approach to illness strongly influenced students of public health and provided some of them with a paradigm for understanding not only sick individuals but also sick cities."

72 "No novelist before Balzac made the city such a looming and living presence, and he offered a model for Dickens' London and Fyodor Dostoyevsky's Saint Petersburg: cities as labyrinths, total environments where survival depends on your ability to read signs, penetrate appearances and, for the ambitious, move out of the "valley of plaster" (where Rastignac begins his Parisian career) to the *beaux quartiers*." Peter Brooks, *Realist Vision* (New Haven: Yale University Press, 2005), 22–23.

73 "The importance of things in this understanding lies in their representative value, what they tell you about the person who has acquired them and uses them as part of his self-presentation." Ibid., 26.

74 Williams, *The Country and the City*, 227.

75 Joyce, *The Rule of Freedom*, 24.

76 On statistics see Mary Poovey, *A History of the Modern Fact: Problems of Knowledge in the Sciences of Wealth and Society* (Chicago: University of Chicago Press, 1998).

77 Williams, *The Country and the City*, 221.

78 Up to then, other 'invisible' people were all those without property and no religious and/or political party affiliation. Joyce, *The Rule of Freedom*, 29.

79 Williams, *The Country and the City*, 222.

80 Joyce, *The Rule of Freedom*, 25.

81 Ibid., 26.

82 "When John Maxwell Barry inquired [William Jones], on behalf of the parliamentary committee, "How did you ascertain the ground to be as flat?" Jones answered, "By viewing the ground, and having been upon it many times." Indeed, Jones as a local could be expected to have a

much more intimate memory of different locations than [Thomas] Telford. Barry pressed. Had Jones drawn his conclusions from "any survey"? "NO," responded Jones, "Not from any survey." Here Barry jumped on him. "I supposed, that without a survey, you could not positively ascertain that to be the case?" Jones protested that indeed he had conducted many surveys, including most of the road under discussion, but he had prepared no map for this particular argument. Barry had no use for Jones's method of reckoning. "If you thought that a more eligible line, why did you not lay it down in your Map?" the interviewer demanded. Jones protested that he was following instructions to outline only the "present Road." A surveyor of the old method, Jones had sighted alternative routes and kept them in his head for the possibility of road making later. In the era of parliamentary debate, where paper evidence won arguments, traditional methods of practical road making without documents won nothing." Guldi, *Roads to Power Britain Invents the Infrastructure State*, 61–62.

83 Koyré, Alexandre: "Galileo and the Scientific Revolution of the Seventeenth Century", in Alexandre Koyré, *Metaphysics and Measurement*, Classics in the History and Philosophy of Science, v. 11 (Yverdon, Switzerland ; Langhorne, Pa: Gordon and Breach Science Publishers, 1992), 4.

84 Ibid., 13. Or, as stated someplace else: "As a matter of fact, even today, the conception we are describing [the principle of inertia, the identification of 'real' space with Euclidean geometric space and that movement and rest are both states] is by no means easy to grasp, as anyone who ever attempted to teach physics to students who did not learn it at school will certainly testify. Common sense, indeed, is – as it always was – medieval and Aristotelian." Ibid., 5.

## Over the territory

Before their demolition in the 1760s, London had seven gates controlling the flow of people and goods in and out of the City: Ludgate, Newgate, Aldersgate, Cripplegate, Moorgate, Bishopsgate and Aldsgate. Together with the Bars, they were not a platform from which one could see countryside stretching into the distance, but rather a commercial threshold protecting the privileges of the City. A century later, the city has grown, the gates have moved and their new names Paddington, Euston, King's Cross, Fenchurch Street, Charing Cross, Waterloo and Victoria. Encircling the metropolis, these railway termini stations are large thresholds in wrought iron and glass, which also manage the flow of people and goods in and out of London, but no longer construct a limit. They are in fact the beginning of the limit's dissolution, the place where the inside – the matter contained by former walls, gates and bars – starts stretching in an impossibly elongated form, for as long as it takes it to reach another inside. The railway, the towns and the cities are joined together, and the subject never has set foot on the outside, but rather, has stayed inside, in a moving compartment of metropolitan comfort. The threshold that termini stations represent is between ways of moving; completely unchecked by them, metropolitan-ness spills out into the territory.

Termini stations marked the end of a journey and also the beginning of a new way of relating to the territory. Up to then, the Ordnance Survey had been the only way of having command over the whole territory through its parsimoniously revealed, and mathematically constructed, snapshots from above. The railway, by contrast, opened up the country for everyone, in almost no time. From the moment the first steam-powered railway was inaugurated in 1831 between Liverpool and Manchester, to the appearance of an idea of a railway 'network' that covered the whole of the country, only a decade had passed. The railway gave access to almost all of the territory, quickly opening up the country and making it available to nearly everyone's eyes. Instead of maps containing the drawing of the whole, the actual territory was connected via the smooth surface of the railway track, set into standard time by the rolling trains, and apprehended in its entirety by the maps and guides that accompanied the transport

revolution. In opposition to the engineering-minded Survey (taking stock of the nation, planning its defence and exploitation), railway maps and guides had an immediate use: to inform the travelling of people, guiding their movement across the island.

The railway invented a new way of being in space. Before the mid-eighteenth century, hardly anyone travelled – Britain's people mostly stayed where they were born<sup>1</sup>. Not until the nineteenth century did individuals start moving farther than their adjoining parishes<sup>2</sup>. Relocations, whether permanent or temporary, were of an exceptional nature. More common than the movement of people was that of objects: for centuries, goods had been transported by water, and as such, they were at the mercy of nature. Until the second half of the sixteenth century, all navigation was done in rivers and along coastlines. Then some improvements were made, in the form of cuttings, embankments, dredging and lock building<sup>3</sup>. These small acts of engineering prefigured the two main man-made transport technologies: road transport and canals. Although both implied major investment, their public reach was minimal: canals were mainly used to transport goods and road travelling implied only a small number of well-off passengers travelling at once<sup>4</sup>. Both were hampered by a lack of coordination: canals were constructed and developed by private initiatives, and their appearance made integration even harder – there was no standard for depth, gauge, measures, etc<sup>5</sup>. Highways, on the other hand, from the mid-sixteenth to the mid-eighteenth century, were administered by parishes, resulting in a disparate and disorganised state of continuous disrepair<sup>6</sup>. Only in the first decades of the 1800s did a certain arrangement of stagecoaches come to exist, providing transport for individual passengers – which, nonetheless, remained an arduous and time-consuming<sup>7</sup>.

Movement over the territory soared as the railway developed: between the 1840s to the 1870s, passenger travel multiplied tenfold<sup>8</sup>. The railway inspired the creation of the first travel agency in 1841, when Thomas Cook organised a group excursion with the Midland Counties Railway, ticket and food included. The popularity of the train developed not only in the comparative cheapness with other forms of transport<sup>9</sup>, but in the unprecedented access it provided for almost all of society's classes. As soon as it became clear that third-class tickets were the major source of income for the railway companies, third-class carts ceased to be open and adopted some of the conditions of the closed wagons<sup>10</sup>. By the 1870s, already two thirds of the railway journeys were third class; in 1844, the Regulation of Railways Bill stipulated that all companies should provide at least one train each way charging no more than one penny a mile, and that all carriages should be protected from the weather<sup>11</sup>. From very early on, the train carried passengers in technological equality for the first time.

It wasn't only the increase in passenger traffic what made railways successful in economic terms. Laying tracks over the ground was less expensive than burrowing and digging canals, and although railways implied major engineering works such

as tunnels or viaducts, its revenues were much higher than the canal's<sup>12</sup>. Cost-effectiveness came accompanied by another kind of efficacy: the train was more suited for topographically-rich Britain<sup>13</sup>: rather than having to engage directly with the particularities of this or that relief, the railway solved the problem posed by the terrain with the imposition of its lines over whatever was below. In this sense, it was also geographically efficient. Railways thus developed in an arbitrary fashion, growing like tendrils from urban centres, joining distant cities and traversing the country through routes that negotiated geography with economy.

The success of the railway overcame nature by the combined action of both tracks and locomotives. The first were invented as early as the beginning of the seventeenth century, in the form of wooden rails over which horses pulled wagons, and flourished in the area of Newcastle. The major disadvantage was that wooden tracks did not last long and were expensive. In the last quarter of the eighteenth century improvements in the iron industry (the patenting of the reverberatory furnace and the puddling process) allowed for cheaper cast iron to be used in conjunction with wooden rails<sup>14</sup>. At the beginning of the nineteenth century, wrought iron rails completely replaced wooden ones. The laying of tracks implied some major reconfigurations of the ground, as iron rails had to rest on a level and uniform bed: the terrain thus needed to be cut, embanked, tunnelled and bridged. On top of this moulded, levelled, elongated new terrain, tracks were assembled, creating a further layer of artificially-made ground. This new overlaid surface, with the material homogeneity of metal, meant that no matter the condition of the territory being traversed, wagon and load could proceed smoothly. The laying of metal tracks over the territory thus started smoothing the rough surface of the island.

A frictionless medium implied the possibility of carrying more load with the same amount of pulling power. Trains had begun their development with the early wooden tracks as horse-pulled wagons, and it was not until the invention of the steam engine that they could fully develop. The first steam locomotive was devised around 1800, and Georges Stephenson's invention of the steam-blast pipe and the tubular boiler allowed locomotives to haul the weight of loaded carriages. Robert Stephenson, George's son, designed a series of locomotives in Newcastle and later became the engineer for the London and Birmingham Railway. The first railway that used steam-powered locomotives over iron rails was the Liverpool and Manchester, opened in 1831, a commercial venture that sought to offer an alternative to the high prices the first canal ever built was charging<sup>15</sup>. From then on, the horse was relieved from its hauling duties, and the combination of smooth tracks and locomotive achieved complete emancipation from the adversities and taxations of nature. People could finally move effortlessly over a normalised territory.

This normalisation, however, was not immediate. The opening up of the territory depended on private initiative, and so it was un-coordinated: the more than thirty operating companies were all private enterprises, sparked by the *laissez-faire* policies promoted by parliament in the 1840s, which resulted in a patchwork landscape of railways, each with its own logic<sup>16</sup>. An early railway guide embodies this situation: *Robinson's Railway Time and Fare Tables and Railway Directory* (1840) offered to its readers a compilation of all the fares and timetables of different companies' routes simply by collating them. Each railway company was given space to display timetables and fares, with their names reflecting the area covered, but there is no attempt at graphically homogenising them. No timetable is alike (neither graphically nor content-wise) and the specifications offered vary greatly: some give specific rules, others just conditions of travelling. The only premeditated sense of coordination offered by Robinson's *Directory* lies in the beginning: "applicable To nearly all the Railways of Great Britain" it offers "Instructions to Railway Travellers" that go from basics such as "[p]roceed at once to the booking office and procure a ticket for the class carriage you intend to travel by...", to "[h]ave your name legibly written on your luggage...", to "[t]he weight generally allowed to each passenger for luggage is about 100 lbs..."<sup>17</sup>.

It was soon clear that coordinated conduct had to be followed by material systematisation – at least partial. When the Great Western Railway argued for maintaining different gauges for the sake of competition, the response was loud: allowing them to keep their broad gauge (for whatever reason), was impracticable. The meeting of two railways with different track width would cause a Break of Gauge. In the words of T. L. Hunt, "the carriages of the one kind not fitting the other kind of rail, (...) [would make it] necessary to transfer passengers and goods from one train to a totally new train"<sup>18</sup>, troubling people and potentially damaging goods. Break of gauge was not only impracticable, but also not necessarily productive of higher revenues. Railway companies would be better off by applying a principle that "[had] been comparatively neglected by writers of œconomy: ... the principle

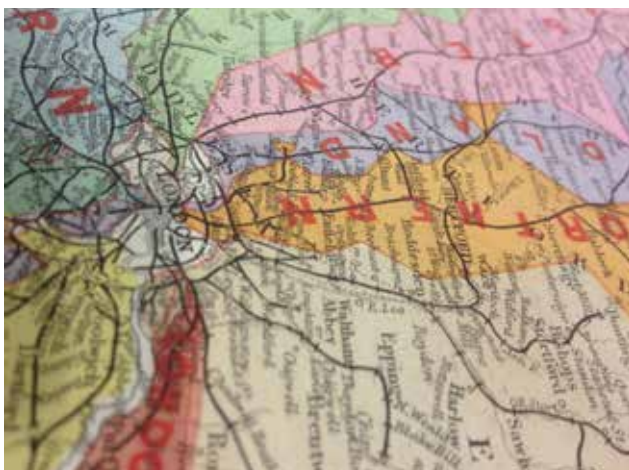
**1. Up trains**  
*Robinson's Railway Times and Fare Tables and Railway Directory (...)*, London, Railway Times Office, 1840

**2. Down trains**  
*Robinson's Railway Times and Fare Tables and Railway Directory (...)*, London, Railway Times Office, 1840

of combination<sup>19</sup>". Combination had allowed for the constitution of the Board of Directors (an entity with quasi-ministerial powers); profit derived not from cutting costs and raising fares, but by offering a reliable service, with fares and accommodation also worked out in combination. The material integration of all railways became the most desirable objective: "to extend it with thorough intelligence and mechanical uniformity over the whole of the kingdom<sup>20</sup>". Only thus would railways become the hegemonic way of moving – and moving the hegemonic way of being. Hunt, the man behind these statements, called his vision the 'Iron Network'.

Material uniformity prevailed, and so the standard track was adopted. In 1846 parliament passed the Gauge of Railways Act stipulating the standard gauge of 4 ft 8 ½ in (1,435 mm) – up to then known as the narrow one. Standard behaviour and standard track were the thin bases over which the railway as a systematic whole was constructed, superseding the reality of administrative and technological independency. The notion of the railway as a 'network' was achieved only on paper: it was on maps where difference was finally made coherent – not an easy feat. Maps of the railway struggled with the contradictory brief of capturing the whole of the railway extension and conveying its inherent diversity, "A New & General Railway Map of England & Scotland"<sup>21</sup>, from 1850, represents all the companies' railways with a black line, giving the impression of a single network. The territory beneath, however, is coloured according to the line's administration, and so the country appears as a patchwork of colour – a colour code that only relates to the rail's administration and has nothing to do with the land itself. In another attempt, the "Station map of the railways in Great Britain"<sup>22</sup>, from 1870, shows the territory in white and each line with a specific colour, giving graphic clarity to the idea of a collection of different companies covering a single territory.

This did not mean that the graphic problem was solved, as an 1880 map, "Mathieson's – Map of the Railway Systems in England and Scotland"<sup>23</sup>, despite the optimistic title promising systematisation, revealed the contradiction between



**3. Black over colour**  
*A New & General Railway Map of England & Scotland (detail), 1850*



**4. Colour over white**  
*Station map of the railways in Great Britain (detail), 1870*





paper and reality. Companies are represented by black lines, and patches of colour are used to show the coverage of each railway company, arriving at very particular solutions – for example, when a track was used by two or more companies, stripes of colour manifested this. The paradox of an non-existent yet necessary network would not be solved until the twentieth century, first during the wars (when they came under the control of the state<sup>24</sup>), and then in the second half of the twentieth century, when they came under the management of a single entity, the British Railways Board<sup>25</sup>. Until this, the systematic whole remained a paperbound idea.

The material and physical changes that the new technology imposed over the topography of Britain and the availability of the country that maps suggested meant that the train changed the way in which the subject perceived the territory. Wolfgang Schivelbusch's *The Railway Journey* describes it as contradictory process: “on the one hand, the railroad opened up new spaces that were not as easily accessible before; on the other, it did so by destroying space, namely the space between points<sup>26</sup>”. The railway annihilated “the traditional space-time continuum which characterized the old transport technology<sup>27</sup>”, by bringing distant regions closer through the speed of the train<sup>28</sup>. As Schivelbusch argues, the train created panoramic vision, a form of proto-montage where the land outside lost its uniqueness and resulted in the death of landscape in its previous form<sup>29</sup>. It became instead what he calls a geographical landscape<sup>30</sup>: the traveller, because of the speed of his journey, perceives the territory not in “relation to the neighbouring place within the circle of visibility [but as] closed” which results “in its entire structure [becoming] transparent<sup>31</sup>” – it makes sense then that the railways adopt the name of their ends, as what goes on in between is unimportant. As foreground vision is lost, because of speed, all that the traveller can see is the background, which ‘moves’ more slowly. As the traveller notices the more prominent elements of the territory, that is, a country's topography, the pleasing rolling of the train creates a ‘monotonous landscape<sup>32</sup>’ unfolding in the window. This kind of vision contrasted with the one that road travelling had offered up to then, where not only particular physical features of the landscape were captured, but also the minutiae of everyday life<sup>33</sup>. With the train, details give way to monotony and variety to continuity: the previously differentiated landscape of the island becomes unified under the smooth continuum imposed by the train.

An insight into the psychological effects of this technological revolution, *The Railway Journey* reconstructs the passengers' experience as one of disengagement with the outside: certainly, the train traveller was disconnected from any effort in moving (neither hers nor that of the animal), was following a set journey and was unable to affect it, was disconnected from the particularities of topography and, finally, was couched by a moving domestic interior that protected him from nature. The relationship with the territory outside thus became primarily visual<sup>34</sup>. To that Schivelbusch adds other ways in which the passenger's body was affected, from tremor-induced maladies (especially in early machines<sup>35</sup>), to the shock of speed



(paraphrasing Simmel<sup>36</sup>). Between these two extremes, between disengagement and shock, the users' manuals that accompanied railway travelling provide another angle into how passengers related to travelling. Their main task being merely informative (fares and times), they quickly evolved into a much more complex companion, bridging the gap between the moving subject and the territory being traversed: they not only informed, but they also explained, prescribed and dictated a way of engaging with the outside and of making the journey intelligible.

The Great Western Railway, established in 1833, from early on started producing its own guidebook. The pocket book "A Guide Book to the Great Western Railway"<sup>37</sup> from 1839 states its purpose:

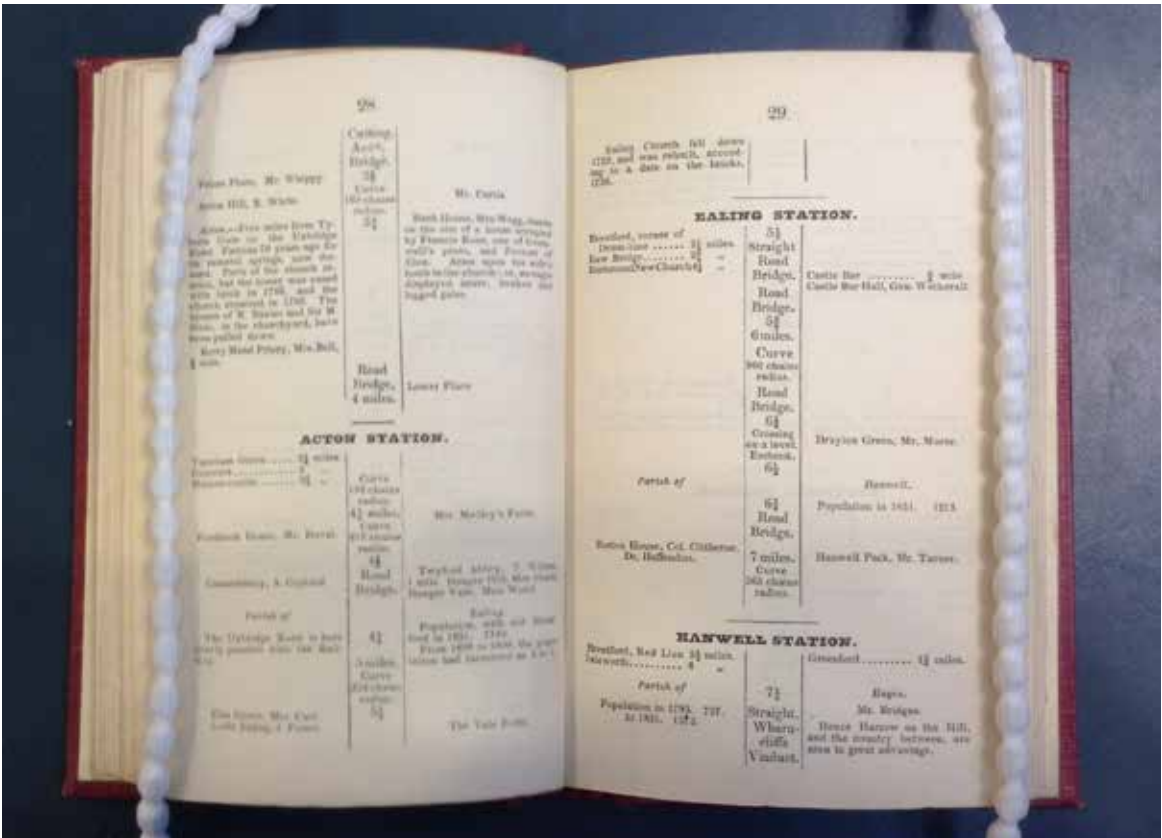
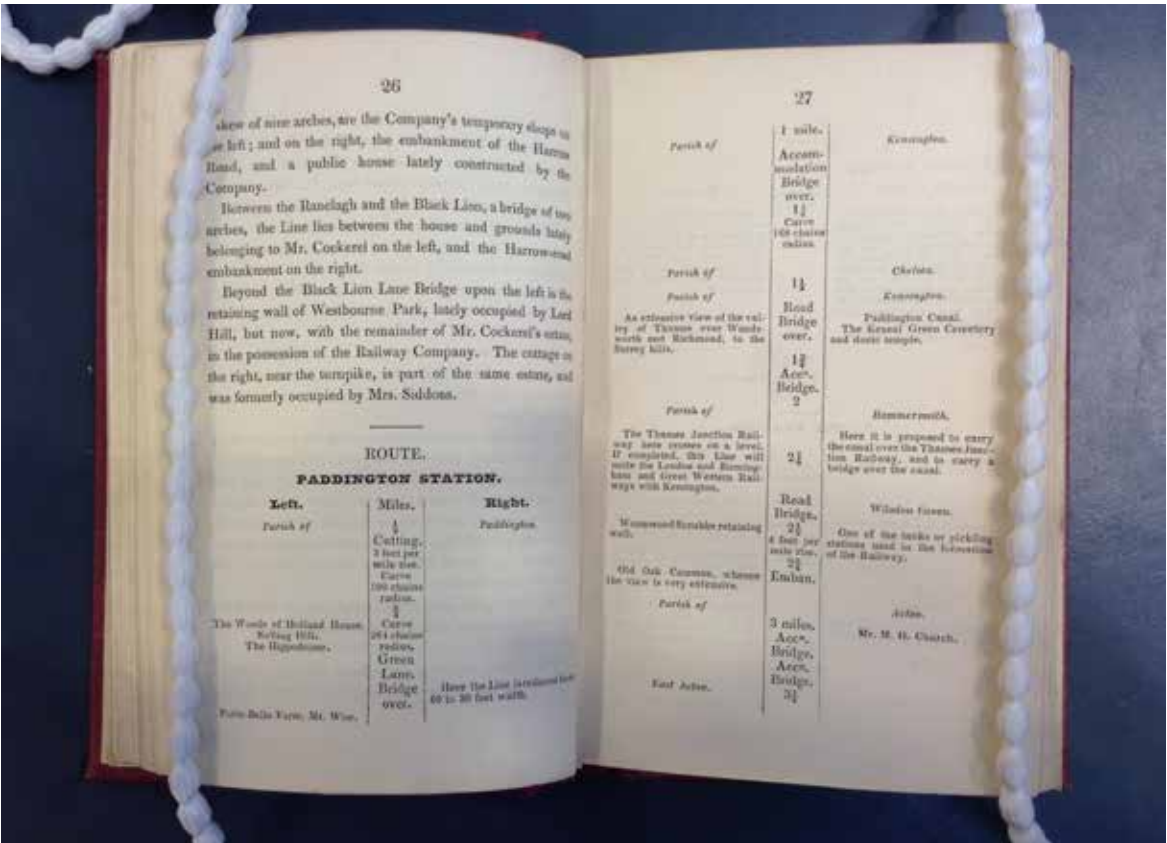
*An attempt is here made to introduce into the pages of a guide book subjects of a nature not hitherto found there. From the manner in which railways are constructed, and from the facilities which they afford for visiting even very remote parts of the kingdom, it seems probable that the study of various natural sciences, and more particularly Geology, together with the subject of Archaeology, will be more generally followed. Hence some of such subjects have here been entered upon (...)*<sup>38</sup>

It tried to offer, in addition to timetables, fares, omnibuses and stagecoaches available and other practicalities, a complete guide to all matters concerning the railway. It starts with a history of the railway line, from developers, parliamentary acts, planning, engineering works, description of tracks, carriages and engines, description of the works undertaken, contracts, contractors and itinerary – making both the journey and the technology comprehensible. Then follows a description of the route, which invents a graphic way of bringing together text-based descriptions of places *outside* the carriage with that of the passenger.

The page is split in three parts, with a thin vertical central column and two wider ones to each side. The central column represents the railway track, and carries information about the distance in miles, changes of direction and so on. The sides, labelled 'Left' and 'Right' have small text blocks describing what can be found by looking out of the window:

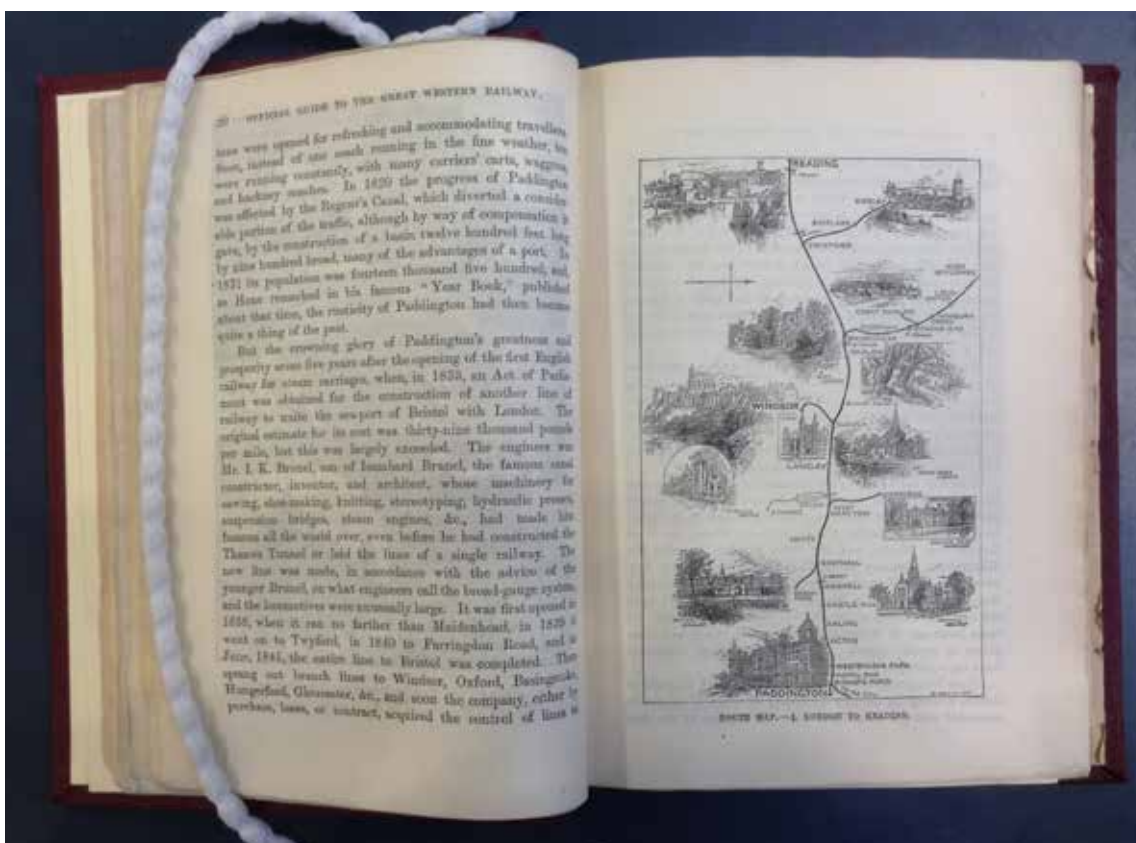
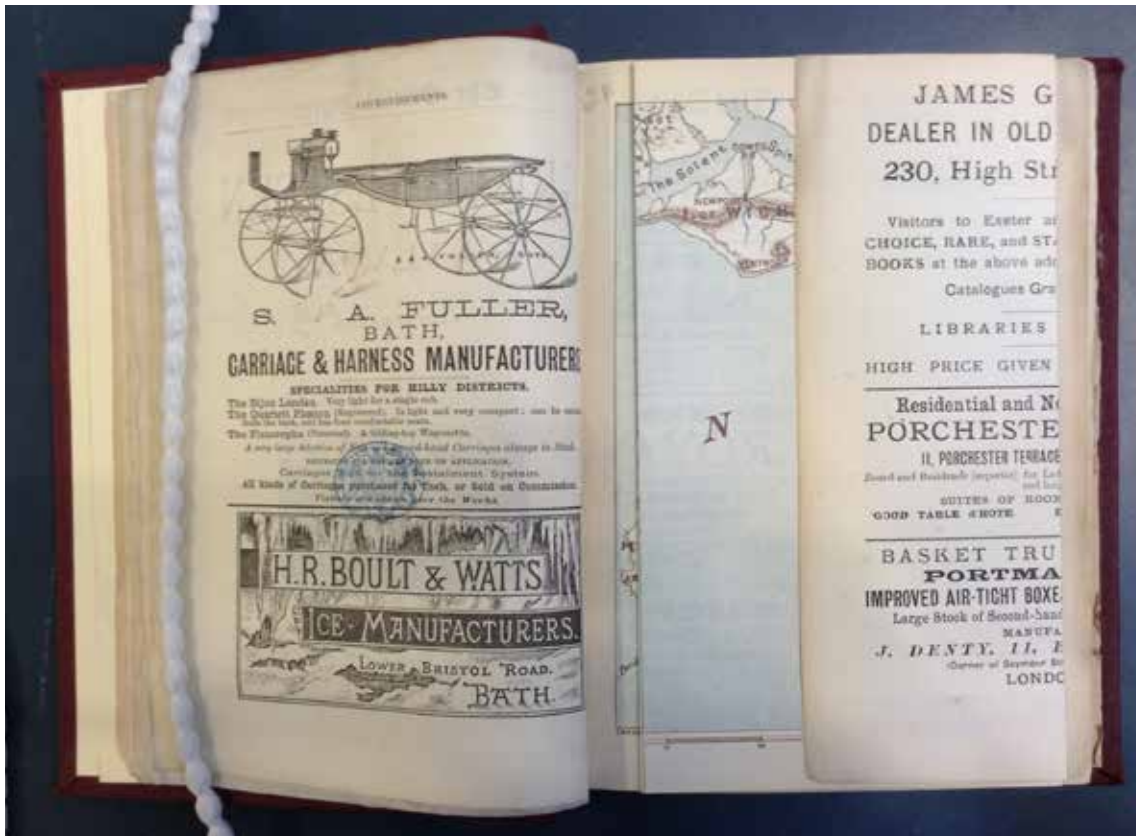
*"[Right] Hammersmith. Here it is proposed to carry the canal over the Thames Junction Railway, and to carry a bridge over the canal (...) [Left] Acton. - Five miles from Tyburn Gate on the Uxbridge Road. Famous 70 years ago for its mineral springs, now disused. Parts of the church remain, but the tower was cased with brick in 1766, and the church repaired in 1780. The houses of R. Baxter and Sir M Hale, in the churchyard, have been pulled down."*

Different kinds of information have been assembled: place names, future developments, position within a larger context, past uses of significant features of the area, buildings to see and even quotidian details that are particular to the place. As both reading and train advance, this strip relays even more information – always in a concise manner, as text is bound to specific parts of the route. There follow descriptions of buildings of interest, stories connected to buildings, property history,



6. The journey begins  
GT Clarke, *A Guide Book to the Great Western Railway* (...), 1839

7. The journey continues  
GT Clarke, *A Guide Book to the Great Western Railway* (...), 1839



## 8. How to travel

*The Official Guide to the Great Western Railway Illustrated*  
London, 1884

## 9. What to do

*The Official Guide to the Great Western Railway Illustrated*  
London, 1884

and archaeological or geological information. After the line reaches Maidenhead, the guide returns to normally-set text, giving a narrative description of the general topography (geological information, orders, groups, formations), the archaeological history of the area crossed in its different periods, and an architectural overview of styles: Saxon, Norman, Early English, Decorated, Perpendicular, with specific recommendations about what to see and what to look for. In essence, this guide proposes that railway travel is not just an opportunity for resting the eyes on a monotonous outside (as Schivelbusch described), but an occasion for learning, for an analytical understanding of the country. The guide introduces a layout (a development of Ogilby's strip map) which is able to describe as the reader moves, replicating her movement and capturing space – and its many layers – effectively.

By the 1880s, however, the focus of the guides had already changed – although still not reduced to the passiveness of Schivelbusch's travellers. The "Official Guide to the Great Western Railway, Illustrated"<sup>39</sup> introduces pleasure and consumerism to the educational, it transforms the trip from the in-between activity to a major part of the pleasures of sightseeing. The guide starts with a section of advertisements for hotels, schools, clothes, florists, then has a folded map of the railway's extension and, finally, folded maps for specific branches which in the verso display more advertisements. Each branch is described in text and engravings, focusing on giving general historical remarks, indicating sites and buildings of interest and activities. The guide ends with more advertisements, this time organised by locality – mainly hotels and restaurants in places where the train goes. The Great Western Railway guide therefore evolved from a traveller's companion to a practical sightseeing guide. By introducing advertisements in such a prominent way, this guide replaces the need to ask for directions: no longer you need to ask your companion, or an inn's keeper, or hire a guide, to know what is coming – commerce serves as the way into the unknown. By knowing what to expect and how much it will cost, the traveller is no longer a stranger: money is a common language that renders difference inexistent.

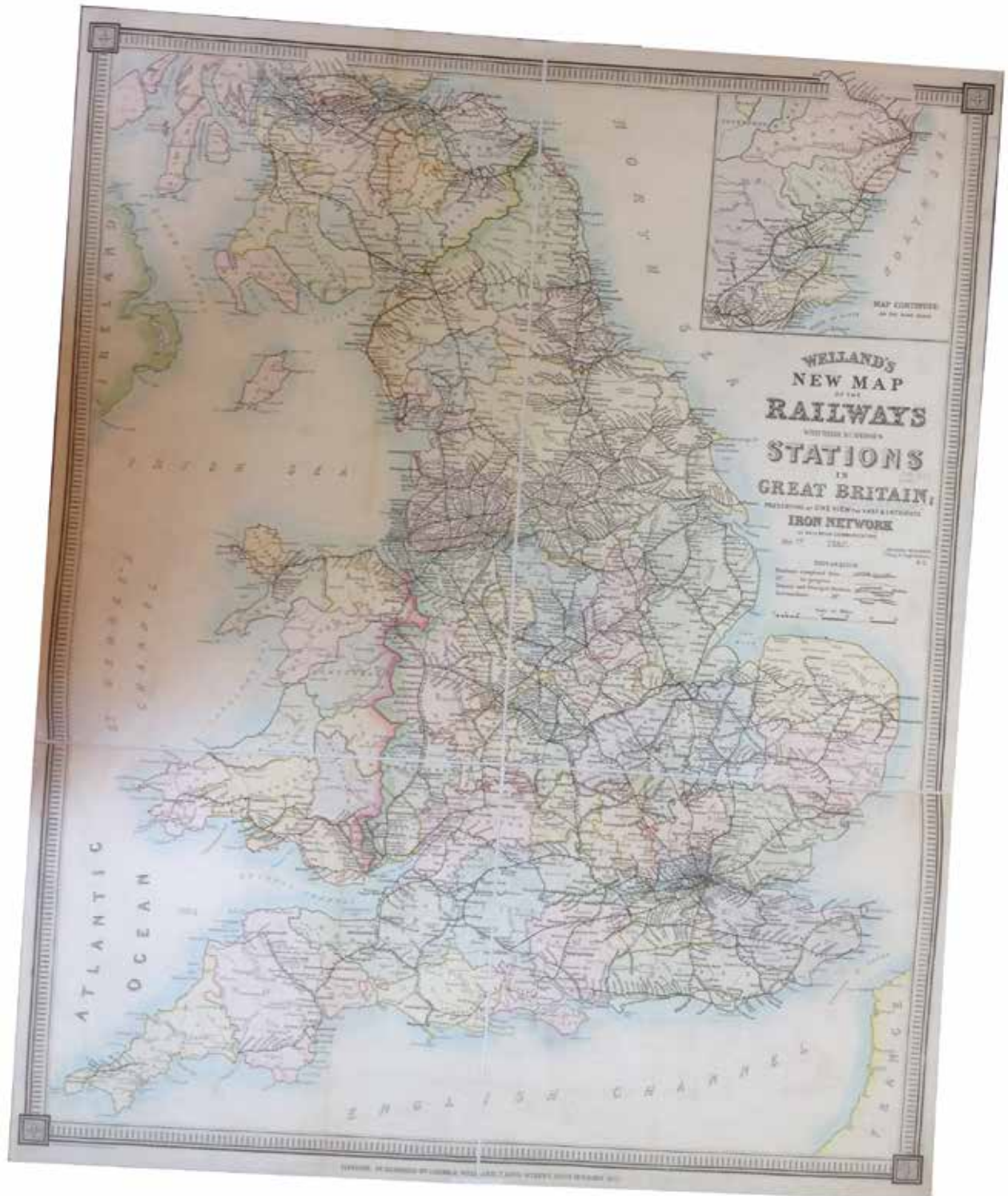
The knowledge of the territory opened up by the railway is thus not only derived from seeing while moving, as described by *The Railway Journey*, but is composed both by the vision of the whole offered by maps and by the detailed view of the guides<sup>40</sup>. The view of the whole that railway maps provided was based on the kind of knowledge provided by the Ordnance Survey, but diverted from it: if the Ordnance Survey offered an accurate vision of the whole of the territory, by coding what was there into graphic signs, striving to achieve mimesis, the railway map abstracted the whole into a drawing that showed only what was necessary to understand how railways worked. This schematic view was fundamental in the construction of the idea of the railway as a system or, even, the idea of 'network'. That this network was physical and only referred to the iron tracks and not to the combination of railways has to do with the fact that the appearance of the network as an organisational device was only just

starting to develop. Despite its debut in mathematics in the eighteenth century through Leonhard Euler's solution to the Königsberg bridge problem, only in the second half of the nineteenth century was this recognised as a network problem. Graph theory, the branch of mathematics that opened up following Euler's solution, only started using dot-and-line depictions after James Sylvester's chemical diagrams<sup>41</sup> – and this is still far off the realm of the everyday. Most probably, it was the railway (and the telegraph, which occupied the same distribution lines as trains) together with the fictional vision of a coordinated whole provided by maps, what started installing in the subject's mind the possibility of such an organisation. Up to then, railways had followed the *Zeitgeist* (i.e. timetables used lattices – the pre-network preferred depiction of complex systems<sup>42</sup>), it is not difficult to see how, this time, railway shaped the *Zeitgeist* in turn.

With the handy view of the whole, railway travelling could also be an experience that went beyond the immediate vision of surfaces, that could see further than what railway map and Ordnance Survey showed. The passenger could get to know about the land as landscape, geography, geology, history. If the scientific map revealed the structure underlying spatial organisation (permanent topographical features, but also land ownership and administration), railway travelling allowed for an immersed, sequential view that could be complemented by the linear and continuous act of reading – where the map had described, the railway guide prescribed. If the Ordnance Survey had established the absolute knowledge of what the territory of the nation was, railway travelling allowed for both distraction from the surroundings or, on the contrary, engagement with it.

What was new in the way of relating to the territory was the way of seeing. If the dominant way of seeing had been constructed by the hegemony of perspective, the railway traveller was putting it to the question. If perspective relied on the existence of a common ground called 'space' that could be translated into paper thanks to projecting lines<sup>43</sup>, the railway was imposing artificial straight lines directly onto the territory. These artificial lines, the railway tracks, created a new smooth surface that erased difference, allowing movement to proceed oblivious of the roughness of the territory below. Biagio Pelacani di Parma's notion of a measurable common ground was challenged by the overlaying of a new smooth surface, which in turn facilitated the subject to move at speed – even more, the only way of *being* over the tracks was *while* moving. Just as traditional conceptions of space became insufficient to describe this, the measurements that mattered were no longer only spatial, but also those of time: early trains had the task of coordinating all clocks to Greenwich time<sup>44</sup> and later on it was the railway that promoted the adoption of a single time for the whole of the country. With space as merely a component of this common ground along with time, distance was no longer a function exclusive of the former, but also of the





10. At last, a network  
Welland's new Map of  
the Railways (...) 1857



latter. The mathematical model derived from Alhazen's theory of visual rays (later perfected by Kepler and Descartes<sup>45</sup>), which allowed for the calculation of distances between observer and objects through geometry, could describe only one part of the experience. The way of seeing instructed by perspective was therefore insufficient, with the images that reproduced this view capturing only one static fragment of it.

Together with a subject that saw differently, the impact of railway travelling affected the role that material, real, space played in orientation. As Britain's surface was re-drawn in lines, the territory-as-topography started to be replaced by the emerging iron network. The different surfaces of the island, with which travellers were more or less acquainted thanks to previous means of transport, were replaced by the sameness of a single material. With this overcoming of nature, the isolation of the subject from the (often adverse) conditions of the exterior, the disappearance of bodily effort and the primacy of graphic views of the whole, the replacement of territory for track made the particularities of the ground secondary. As traditional limits, distances and measurements became insufficient to describe the new experience, space ceased to be the central component of orientation.

Orientation relocated to the manual. As railways extended, the metropolis colonised what used to be countryside, blending everything into sameness – a sameness only to be qualified and rendered unique by the reading performed inside the couched, fast-moving interior of the train. The opening up of the territory and the confrontation with the unknown were rendered normal by the translation provided by the manuals. In between subject and territory, bridging the gap between ground and moving passenger, manuals made sense of the situation, gave directions, described the context and prescribed a way of behaving. Contained in the *graphein* of the manuals, captured in words, drawings, schemas and proto-graphs, was the key to finding where one was and where one was going. No longer had the eye to look for the sun in order to find the orient, it just had to look down into a page and read; no longer had the mouth to articulate questions to know what was coming, it could just silently absorb what was being spelt out in the guide. Within the railway termini stations found in the metropolis, then, the most important place was not the grand iron and glass threshold, but the inconspicuous bookstall, selling newspapers, folded maps and railway guides. Inside this unassuming and ordinary architecture, knowledge of the territory was effectively traded and consumed in a way that the Ordnance Survey could only dream of.

- 1 Philip S. Bagwell and Peter J. Lyth, *Transport in Britain, 1750-2000: From Canal Lock to Gridlock* (London: Continuum, 2006), xi.
- 2 Guldi, *Roads to Power Britain Invents the Infrastructure State*, 171. As Savage notes: "The remoteness and impenetrability of places like Dartmoor, where witchcraft was practised, persisted right down to the nineteenth century." Christopher I. Savage, *An Economic History of Transport* (London: Hutchinson & Co., 1959), 13.
- 3 Bagwell and Lyth, *Transport in Britain, 1750-2000*, 2.
- 4 "Over the [second half of the XVIII century], a home-grown tourist industry in Britain had been steadily burgeoning, propelled by a variety of factors. It was significant that the number of turnpike roads had exploded over the second half of the eighteenth century." Hewitt, *Map of a Nation*, 183. The Napoleonic wars also had an impact on travelling, since the continent became off-limits.
- 5 Bagwell and Lyth, *Transport in Britain, 1750-2000*, 15.
- 6 Savage, *An Economic History of Transport*, 11.
- 7 "A journey from London to Edinburgh in the sixteenth century would have been performed by post horse requiring twelve to twenty days. In the middle of the seventeenth century, the earliest stage coaches had run once a fortnight and taken thirteen days; and as late as 1754 the journey took ten days in the summer and twelve in winter. By 1776 the 'Flying Coaches' had reduced this to four days; and at the end of the eighteenth century, mail coaches spent three days and two nights on the journey. At the height of the coaching era, in 1832, the journey time was reduced to forty-two hours thirty-three minutes." Ibid., 30. citing Peter Masefield, 'British Transport in the National Economy', *Journal of the Institute of Transport*, November 1955.
- 8 "The number of journeys made by railway rose from 27,763,602 in 1844 to 288,632,921 in 1870, or by more than ten times." Bagwell and Lyth, *Transport in Britain, 1750-2000*, 54.
- 9 "On the Leeds and York Railway the fare initially charged for the thirty-one mile journey of eighty minutes was 3s. 6d., compared with the 3s charged for a four hour journey on the outside seat of a coach." Soon after, the directors of the railway would even lower the fare to 2s. 6d. Ibid.
- 10 Among the innovations, seats: on early trains, "[t]hird-class passengers rode in open carts in which they had to stand." Gregory Votolato, *Transport Design: A Travel History* (London: Reaktion, 2007), 34.
- 11 Bagwell and Lyth, *Transport in Britain, 1750-2000*, 58.
- 12 Ibid., 17.
- 13 Ibid., 18.
- 14 Ibid., 51-54.
- 15 The Bridgewater Canal, opened in 1761, moved coal from Worsley to Manchester. The Duke of Bridgewater took his inspiration from the Canal du Midi in France (opened in 1681), built to help circulate wheat. Ibid., 54.
- 16 In stark contrast to the continental experience of centralised, state-led railway enterprise. Ibid., 56.
- 17 "Robinson's Railway Time and Fare Tables and Railway Directory, Containing the Names of the Directors and Correct Time & Fare Tables, of All the Principal Railways in Great Britain, with a Compendium of Railway Information, Derived from Original Sources and a Corrected Railway Map of England and Wales." (London: Railway Times Office, 1840), 2.
- 18 Thornton Hunt, "Unity of the Iron Network; Showing How the Last Argument for the Break of Gauge, Competition, Is at Variance with the True Interests of the Public" (London: Smith, Elder and Co., 1846), 5. (Third edition). Thornton Leigh Hunt was the first editor of *The Daily Telegraph*.
- 19 Ibid., 17.
- 20 Ibid., 31.
- 21 "A New & General Railway Map of England & Scotland ... Scale, 10 Miles to One Inch. (The Railroad Travelling Map of England, Wales & Scotland)." (London: H.G. Collins, 1850). British Library, Maps 9.b.7.
- 22 "Station Map of the Railways in Great Britain. Designed by Z. Macaulay and Corrected by the Companies. Scale of 10 Miles to an Inch." (London: Smith & Ebbs, 1870). British Library, Maps 1150.(30.)
- 23 John Airey, "Mathieson's -Map of the Railway Systems in England and Scotland. Corrected to Jan 1st 1880. Reduced by Permission from the Standard Map of R. Price Williams Esq., M. Inst. C. E. Compared with the 'Railway Junction Diagrams' (by John Airey Esq.) and with Returns Furnished by the Companies." (London: Mathieson, 1880). British Library, Maps 1150.(37.)
- 24 Bagwell and Lyth, *Transport in Britain, 1750-2000*, 69.
- 25 Ibid., 136.
- 26 Wolfgang Schivelbusch, *The railway journey: the industrialization of time and space in the 19th century* (Berkeley: University of California Press, 1986), 37.
- 27 Ibid., 36.
- 28 Ibid., 42.
- 29 It is debatable however that there was a 'landscape' to begin with, as it probably hadn't been *seen* yet. Vision, of course, is paramount to the existence of a landscape (the aesthetic appreciation of the territory).
- 30 Schivelbusch, *The railway journey*, 53.
- 31 Ibid.
- 32 Ibid., 60.
- 33 And as Schivelbusch illustrates by quoting Ruskin: "to any person who has all his senses about him, a quiet walk along not more than ten or twelve miles of road a day, is the most amusing of all travelling; and all travelling becomes

dull in exact proportion to its rapidity.” (Ruskin, vol. 5, p. 370) in *Ibid.*, 58.

**34** One could say that Jonathan Crary’s argument on vision is basically the same:

“The subsequent dissociation of touch from sight occurs within a pervasive “separation of the senses” and industrial remapping of the body in the nineteenth century. The loss of touch as a conceptual component of vision meant the unloosening of the eye from the network of referentiality incarnated in tactility and its subjective relation to perceived space.” Jonathan Crary, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century*, Nachdr., October Books (Cambridge, Mass.: MIT Press, 2005), 19.

**35** Schivelbusch, *The railway journey*. See chapter 7, “The Pathology of the Railway Journey” and chapter 9, “Railway Accident, ‘Railway Spine’ and Traumatic Neurosis”.

**36** “Increased velocity calls forth a greater number of visual impressions for the sense of sight to deal with. This multiplication of visual impressions is an aspect of the process peculiar to modern times that Georg Simmel has called the development of urban perception. He characterizes it as an ‘intensification of nervous stimulation’ which results from the swift and uninterrupted change of outer and inner stimuli”. *Ibid.*, 56–57. Quoting *The Sociology of Georg Simmel*, ed. Kurt M. Wolff (Glencoe, Ill. 1950), p. 410. Schivelbusch proposes that the railway played a significant part in shaping ‘industrialised consciousness’ (Schivelbusch, 170), one that developed a thick ‘stimulus shield’ (Freud) in order to be able to deal with the ever-changing environment.

**37** George Thomas Clark, “A Guide Book to the Great Western Railway, Containing Some Account of the Construction of the Line. With Notices of the Objects Best Worth Attention upon Its Course; and Tables of Distances, Time, and Fares of the Trains; and Hackney Coach and Car Fares; Together With

the Proceedings of the Great Western Steam Ship Company.” (Smith & Ebbs: R. Groombridge, 1839). British Library General Reference Collection 1489.m.73.

**38** *Ibid.*

**39** Great Western Railway, “The Official Guide to the Great Western Railway. Illustrated.” (London: Cassell & Co., etc 1884). British Library, 010351.i.3.

**40** The panoramic vision created by the train has become a cliché, often serving proto-cinematographic arguments (see for example Fred Truniger, *Filmic Mapping: Film and the Visual Culture of Landscape Architecture*, Landscript 2 (Berlin: Jovis Verlag, 2013).) However seductive this understanding is, it is totally anachronistic, as film started being developed only by the end of the nineteenth century – and was a shock in its own right.

**41** See ‘Graph Theory’ by Stephan C. Carlson, in <https://www.britannica.com/topic/graph-theory>

**42** Guido Caldarelli and Michele Catanzaro, *Networks: A Very Short Introduction*, 1st ed, Very Short Introductions 335 (Oxford: Oxford University Press, 2012), 18.

**43** Hans Belting, *Florence and Baghdad: Renaissance Art and Arab Science* (Cambridge, Mass: Belknap Press of Harvard University Press, 2011), 146–148.

**44** Bagwell and Lyth, *Transport in Britain, 1750-2000*, 63.

**45** Belting, *Florence and Baghdad*, 124.

## On the road

Stepping outside the shop in Oxford Street, Orlando quickly mounted her car as the clock struck eleven. The “...motor-car shot, swung, squeezed, and slid, for she was an expert driver, down Regent Street, down Haymarket, down Northumberland Avenue, over Westminster Bridge, to the left, straight on, to the right, straight on again...” As she advanced, “[l]ong vistas steadily shrunk together. Here was a market. Here a funeral. Here a procession with banners upon which was written ‘Ra–Un’, but what else?<sup>1</sup>” It was the beginning of the twentieth century and the subject had found another technology that allowed her to move at speed over the territory. Speed fractured the perception of the outside, and with it, Orlando’s own self-awareness: “[a]fter twenty minutes the body and mind were like scraps of torn paper tumbling from a sack and, indeed, the process of motoring fast out of London so much resembles the chopping up small of identity which precedes unconsciousness and perhaps death itself that it is an open question in what sense Orlando can be said to have existed at the present moment<sup>2</sup>”.

Fortunately, this technology encased her in a personal space: an interior, generic in its origin yet made domestic by way of its materials and its possibility to keep the subject’s familiar stuff in. With the car, she could move at will over the territory, crossing boundaries between the urban and the rural without even having to pass under grandiose thresholds. Streets turned into roads, roads into highways, highways into rural roads, and so the automobile could improvise unthought-of connections: if the train passenger had adapted her desire for movement to what was offered by the railway ‘network’, the driver was in command. Yet this command didn’t extend much further than the steering wheel: speed made the outside a blur. Vision was broken down: “[w]hat was seen begun – like two friends starting to meet each other across the street – was never seen ended<sup>3</sup>”. Might the solution be at hand, in the form of a map kept close while driving?

Alas, roads in maps were not a matter of clarity either. From 1884 onwards, it had been standard practice in Ordnance Survey maps to use shading as a way of classifying roads according to their administrative status. This classification was a broad one: shading indicated that the road was public, kept in good repair and that it depended upon a highway authority – “[including] county, district and parish surveyors<sup>4</sup>”. In 1896, roads were catalogued as first class if they were Main roads and second class if they were District roads, but both were equally shaded, and roads that weren’t neither Main nor District but were metalled and kept in good repair (i.e. that “it should be possible to drive carriages and light carts over them at a trot<sup>5</sup>”) were also shaded. Only third class roads were not shaded – and these could again be metalled or unmetalled. Shading was thus an indication that didn’t cast much light on the nature of the roads, be it administrative or functional – the graphic confusion, a sign of the road’s status within the territory’s hierarchy.

In the nineteenth century roads became secondary to the railway. The availability of the territory and the grasp of the whole provided by the material and graphic rail ‘network’ contrasted sharply with the lesser significance of roads. By then, these were neither smooth nor integrated even if, before the railway, roads had been the major means for travelling in Britain. Rather than being connected, however, roads and highways had always reflected the disaggregation of their administration: under local parishes since 1555<sup>6</sup>, only in the eighteenth century did they become a concern of central administration, the so-called infrastructural state<sup>7</sup>. This meant the imposition of a certain homogeneity over the territory, and so “[r]oads that had once assumed the colours of their local geology, from Devon’s pinkish soil to Lancashire’s grey grit, were buried under anodyne tar.”<sup>8</sup> The invention of the tar macadam accompanied discussions in parliament over centralised administration and upkeep, pitching MPs against engineers – the first resisting it<sup>9</sup>, the second promoting it<sup>10</sup>.

On these contested ground, a discreet organisation of movement had managed to get established nonetheless: the stagecoach system was relatively fast, ran on schedules and was in coordination with an accommodation network of inns<sup>11</sup>, becoming even more established when the post coach was introduced in 1784, offering reliable and affordable travelling for the middle class. This had political consequences when in 1822 previous vagrant communities were banned from the road, evicting soldiers, Methodists, artisans, journeymen, tradesmen, pedlars and the unskilled poor, immigrants, harvest labourers, gypsies, entertainers, tinkers, beggars, children and women, leaving the road exclusively for travellers on wheels<sup>12</sup>. The middle classes travelled couched by the interior of the coach and their movement was supported and directed by a series of publications that offered knowledge of the route. Maps and guidebooks gave a reassuring view of the whole of the country, criss-crossed by roads and served by resting places, while manuals of etiquette for stagecoach conversation kept things civilised<sup>13</sup>.

With the popularisation of the railway in the second half of the nineteenth century, road travelling fell into relative disuse. This resulted in the fall from grace of roads with parliament, the public, etc<sup>14</sup>, which meant a rapid worsening of their material conditions. The Ordnance Survey thus was only reflecting this secondary nature: despite the fact that road construction and mapping had had a joint origin in the pacification of the Highlands, at the turn of the century roads didn't have a clear way of being depicted. When road shading was abolished in OS maps in November 1912, it coincided with the peak of the motoring revolution. As roads improved materially and engines, tyres and cars developed, there came a new way of classifying roads, a new way of depicting them graphically and a new role for the resulting map. Classification was the key to the problem: this act, which had not only graphic consequences, but also on the roads themselves, resolved the dilemma of how could a body that was kept inside a moving interior at speed relate to, understand and get to know the immensity of the territory outside. The Michelin company embodies the parallel (and related) evolution of the field in France: they covered every scale of the automobile problem, from component to territory, as they not only made tyres but invented the demand for better roads by way of their guides<sup>15</sup>.

Despite its material and cultural lightness, the bicycle was the herald of the British roads' resurrection. Its development brought the invention of the pneumatic tyre<sup>16</sup>, the internal combustion engine<sup>17</sup> and the lobby for the improvement of unkempt roads, through the cyclist associations (the Cyclists' Touring Club or the National Cyclists' Union)<sup>18</sup>. When the car made its appearance, speed, free will and discussion about road quality were already heated topics. By the 1890s motorcars were being produced in Britain<sup>19</sup>, mostly on demand and of very light construction<sup>20</sup>. In 1903 the Motor Car Act was passed, recognising it as a distinct mode of transport, and introduced a speed limit of 20mph, the need for driver licensing, identification marks and so on<sup>21</sup>. By 1914 Henry Ford's 'universal car' was producing affordable cars and influencing the whole of the industry<sup>22</sup>. Already in 1909 the greater presence of bicycles, motorcycles and cars in British roads resulted in the passing of the Development and Road Improvement Funds Act. A Road Board was established, collecting duties from motor vehicles and taxed fuel and channelling these resources to local authorities<sup>23</sup>. In 1913, one of the Board's senior engineers, Sir Henry Maybury, started the process of numbering the existing roads, a task that would be followed by traffic assessments, both allowing for the distribution of funds according to category and responsibility<sup>24</sup>.

This was the first attempt at systematically understanding roads as they worked, rather than as they looked. Maybury's classification reduced roads to a set of quantifiable parameters that allowed for a simpler way of organising them. The First World War hindered this process and, at the same time, underlined the importance of a fully functional, integrated road network: what mattered was not just the material condition of roads, but that they could be managed as a whole. Maybury's initial



classification project was insufficient, as it replicated the autonomous administrative conditions in use for centuries: classificatory numbering was constrained by county limits, with an inter-county road having different numbers. In 1919, Maybury, now part of the recently formed Ministry of Transport<sup>25</sup>, adjusted his plan and devised a national naming system that integrated the existing roads into a country-wide network: this time names would create, instead of replicate, reality. This idea had its precedent in the French case: Napoleon started the national road system (the ‘N’ roads) as a series of radii stemming from Paris and numbered clockwise, but it was André Michelin who pushed for even further systematisation.

Michelin had been publishing road maps to help motorists since 1906, but these were just an improved version of the French Ordnance Survey maps, carrying a little more information than survey maps<sup>26</sup>. In 1909, he concluded that the key to moving on French roads was not just in having a map of them, but in the coordination of the map and the road within one system, one made of systematic naming. Only within a fully coordinated system, drivers would be able to travel at speed without needing to comprehend and deal with the complexities of the territory crossed by roads; in other words, roads needed an orientation system independent from its surroundings. For this, each road had to have a name, which should be printed on the map, and clearly signposted over the course of the road – the three elements composing Michelin’s Ariadne’s thread<sup>27</sup>. Milestones displaying internal road names were already in use (after all, they were a Roman invention), but they weren’t addressing motorists: the stones’ text was parallel to the road. Michelin found that his total redesign of orientation needed to start by re-orienting the milestones themselves so they could face drivers<sup>28</sup>.

French milestones were not re-oriented, but Michelin’s influence was felt even in Britain<sup>29</sup>. The British adopted the radial organisation with its centre in London, assigning A for main arteries (to Edinburgh, Dover, Portsmouth, etc), and A-starting numbers for the pie-shaped areas defined by the main A-roads. B was reserved for local roads and C for those that wouldn’t even appear on a map<sup>30</sup>. There followed a period of

**ROAD BOARD CLASSIFICATION OF ROADS.**

CLASSIFICATION FORM No. .... ANALYSIS OF TRAFFIC STATISTICS, abstracted from Form No. 6.

COUNTY: .....

All figures are daily averages, compiled from Census taken on 7 consecutive days from 6 a.m. to 10 p.m.  
The TOTAL in column 20 is the sum of columns 16 and 18 plus the computed weight of ordinary Cycles, Horses, Cattle etc., items 1, 22, 23, 24 on Form 6.  
The weights given in Cols. 12, 14, 16, 18 and 20 have been computed as per scale on Form No. 6.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Town, City, District, or other place.	Urban, Suburban, or Rural.	Highway Authority.	Endorsed by Registrar of Motor Vehicles.	Grade.	Motor Cars and Motor Cycles, Items 1 and 2 on Form 6.	No. of Motor Cars and Motor Cycles.	No. of Horses, Cattle, etc., Items 1, 22, 23, 24 on Form 6.	Weight of Motor Cars and Motor Cycles, Items 1 and 2 on Form 6.	Weight of Horses, Cattle, etc., Items 1, 22, 23, 24 on Form 6.	Motor Cars and Motor Cycles, Items 1 and 2 on Form 6.	Weight of Motor Cars and Motor Cycles, Items 1 and 2 on Form 6.	Motor Cars and Motor Cycles, Items 1 and 2 on Form 6.	Weight of Motor Cars and Motor Cycles, Items 1 and 2 on Form 6.	Motor Cars and Motor Cycles, Items 1 and 2 on Form 6.	Total of all Motor Traffic.	Motor Cars and Motor Cycles, Items 1 and 2 on Form 6.	Weight of Motor Cars and Motor Cycles, Items 1 and 2 on Form 6.	Motor Cars and Motor Cycles, Items 1 and 2 on Form 6.	Total of all Motor Traffic.

1. Classification Form  
Circa 1914, Ministry  
of Transport

considering how to assign the numeral part and how to integrate Scotland, but by 1923 the Ministry of Transport finished numbering roads. Officially, there was a coherent and systematised road network, even if its material conditions had not changed much in the interim: the Roads Act of 1920 planned on improving existing roads “as regards alignment, foundation and surface” and with the addition of “new roads and by-passes (...) new bridges (...) and [the reconstruction and strengthening] of existing bridges” in the immediate ten years<sup>31</sup>. However, even if the authority now existed, its direct powers were minimal. In 1936, with the Trunk Road Act, only a fifth of all main roads was under the responsibility of the Ministry of Transport<sup>32</sup>, and only these would be paid for by general taxation<sup>33</sup>. The need for a national understanding of the road network clashed with the laissez-faire, private-oriented, liberal frame of mind: transport in general was still seen as part of private industry rather than as a public service.

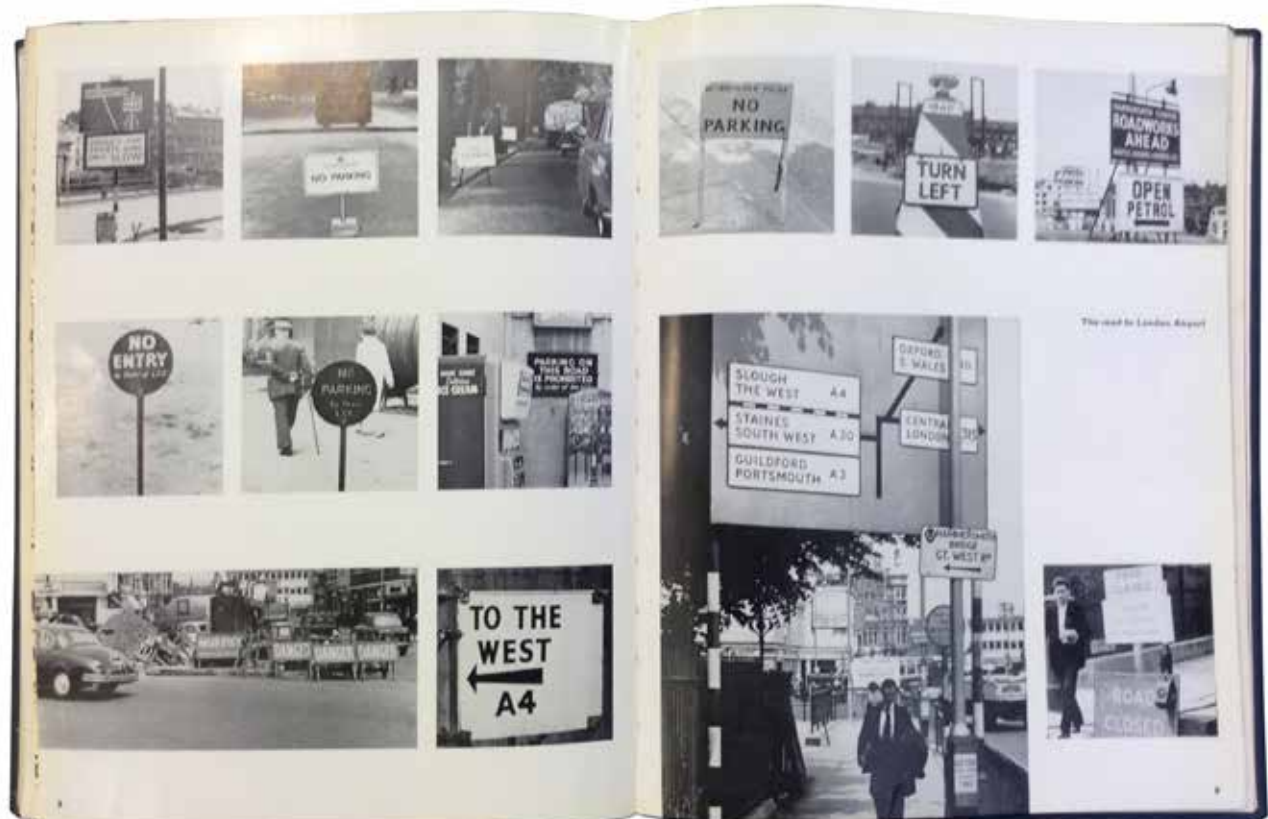
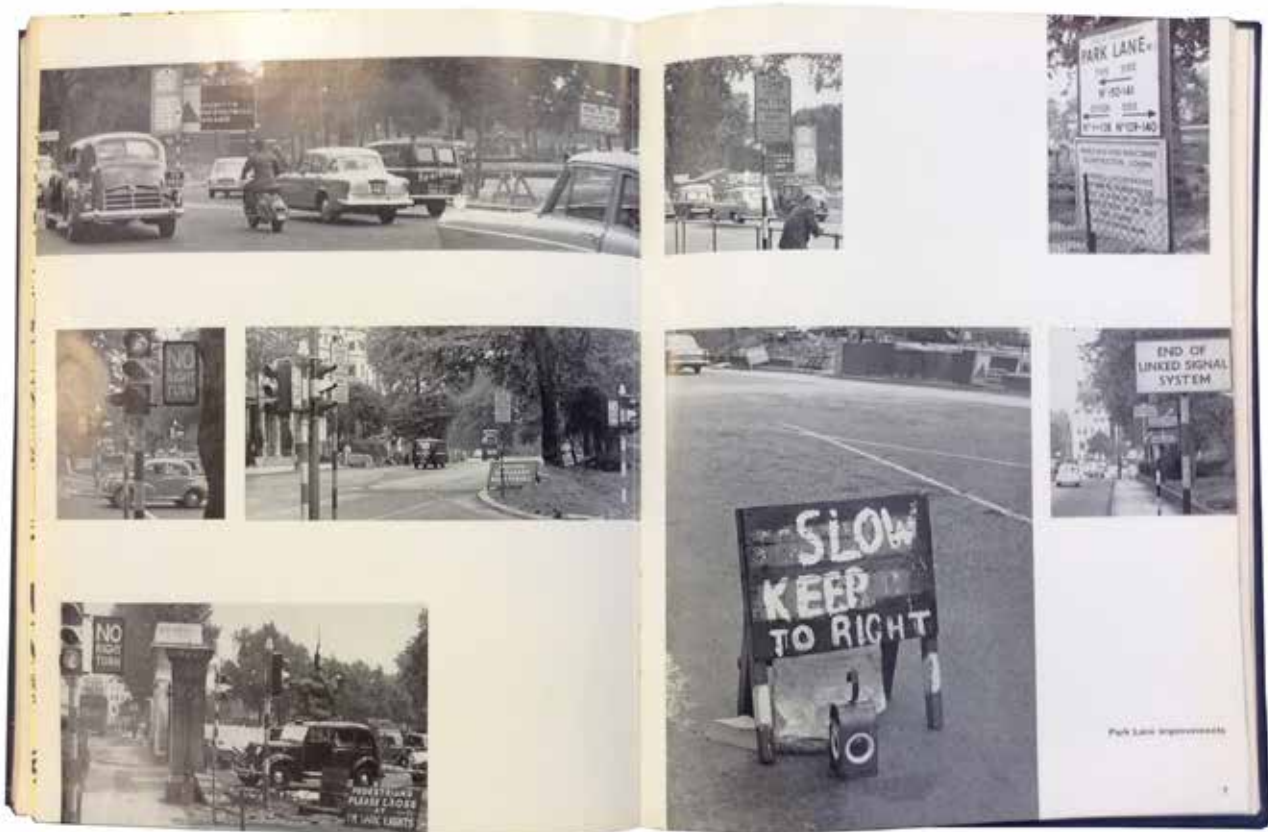
The new naming system immediately made its appearance on maps, replacing topographical information derived from the Ordnance Survey with lines, letters and digits, the new language of orientation. As topography was replaced with alphanumeric topology, maps from then on were not only about pictorially rendered surfaces, but would describe the road network as a graphic *and* conceptual coherent whole. The idea of the road network was the result of the imposition of a system alien in all senses, a structure coming from the realm of abstract codes. The idea of the whole was an alphanumeric one, and so the map’s task was to reveal the whole when prompted by the partial information displayed on signposts, with maps becoming a fundamental tool for navigation. The material component of this system, roads, was secondary to the new topology and, as motorway construction started in the late fifties, it would become even more detached. In 1959, the first Motorway (the M1) was built between London and Birmingham, and this model would spread from then: roads built in dugouts, with carefully controlled accesses and exits, with efficiency as the leading concept and the straight line as the main shape. Whereas in Germany the autobahns had been the children of totalitarian regimes, in Britain they



**2. Visual clarity in signs**  
Ian Nairn, *Your England Revisited*, 1964



**3. The English tradition: landscape as legal document**  
Ian Nairn, *Your England Revisited*, 1964



4. Slow Keep Right  
"Mile-a-Minute Typography",  
Typographica 4, 1961

5. To the west  
"Mile-a-Minute Typography",  
Typographica 4, 1961





6. Caution road up  
"Mile-a-Minute Typography",  
Typographica 4, 1961

7. Danger Live  
"Mile-a-Minute Typography",  
Typographica 4, 1961

were the children of the Conservative governments in the fifties, which set out to make the car the main means of transport<sup>34</sup> – not unlike the afterlife of the German autobahns, adopted by the Federal Republic as a sign of their own efficiency<sup>35</sup>.

Disconnected from its surroundings by both physical barriers (such as sound barriers) and conceptual ones (as in the alphanumeric names), roads became a maze. The idea behind road classification had been to promote a more logical way of navigating it, as the alphanumeric codes imparted information on how major roads connected to minor ones and, at the same time, the code had a geo-referenced position (at least the main ones) that could be consulted in a map. The experience of the system, however, was far away from the clarity of both codes and maps. As Herbert Spencer's photographic essay "Mile-a-minute typography" (published in a 1961 *Typographica* issue<sup>36</sup>) demonstrated, the actual landscape was one of messiness and confusion, with a disorganised and chaotic array of signs distracting the driver – one only has to look at his pictures to feel completely lost. The sign, the external object supposed to clarify location and direction, and to provide support for navigating the coded road network, was not working at all.

Spencer was part of the graphic design offensive determined to solve this by good graphic design, especially in regard to lettering. The fifties had been productive for graphic design, with scholars and practitioners like Nicolette Gray and Otl Aicher (one of the founders of the Ulm School of Design) at the forefront. Gray was especially interested in the question of an English typography, not in a historicist way but, on the contrary, animated by questions, such as the problem of lettering and the modern movement<sup>37</sup>. Discussions were highly architectural since questions of lettering had had to do with buildings – buildings had been the main support of written messages. Life on the streets showed something else, however: lettering was everywhere, from buildings, to kerbs, to roads, to signs, to fences, in different media, materials, fonts and styles. The problem of road signage was central: *Typographica* tackled the problem of the state of road signage after the 1957 UN international treaty of Geneva, where conventions for traffic sign regulations had been accorded. The recommendations were for succinct and systematic graphics, but the panorama of British road signage was chaotic. As Herbert Spencer puts it in the introduction to his "Mile-a-minute...",

*The hundreds of temporary or permanent prohibitory, mandatory, directional, informative, or warning signs that assail and sometimes guide, but all too often confuse, the motorist driving along the relatively short route between Marble Arch and Heathrow are a remarkable demonstration of literary and graphic inventiveness in a field where discipline and restraint would be both more appropriate and considerably less dangerous.*<sup>38</sup>

A more rational approach was needed, one that would follow the recommendations that Aicher had made in *Stile Industria* 33. This would be a sign system used nationally, in accord with European practices. Not surprisingly,

the British lack of system was the result of the proliferation of authorities allowed to put up signs: local authorities, Ministry of Transport, the police and motoring organisations (Royal Automobile Club and Automobile Association) among others, and each with its own graphic logic. Or lack of it: the graphic designers' diagnosis was that signs needed less words and more pictorial symbols, as words took too long to decode and could often be ambiguous<sup>39</sup>.

The problem reached parliament with the construction of the M1. The Anderson Committee was set up in 1957 in order to figure out the signage problem, resolving to commission designer Jock Kinneir the creation of signs for the M1<sup>40</sup>. Kinneir, together with Margaret Calvert, developed a graphic system, based on the continental experience post-UN treaty, which codified signs into a coherent system: for the M1, there would be signs composed of white letters over green background, using a newly created typography, Transport, roughly based on the German type Akzidenz Grotesk. After the introduction of the M1 system, they were employed by the Worboys Committee in 1963 (another parliamentary commission), to develop a sign system for the whole country. When Kinneir and Calvert's contribution to the problem of signage is discussed, it is usually seen as a typographic one – their innovation being the use of sans serif types and of a combination of upper and lower cases<sup>41</sup>. These two proposals certainly created polemics but, underlying the graphic design discussions, there was really a debate of national identity. Both the serif type and the use of upper cases were part of the English costume in road signage, so Kinneir and Calvert's proposals were being seen as too little English. Those in favour of a local approach even attacked the need for a nation-wide graphic convention: David Kindersley, a stone letter-carver and typeface designer, rallied against the imposition of an European system, arguing that it would wash away English identity<sup>42</sup>.



8. Sketch for sign  
Jock Kinneir and  
Margaret Calvert, 1960,  
Design Museum





**9. Stamford maquette**  
Jock Kinneir and Margaret Calvert, circa 1960, Saint Bride Library



**10. Hand-made roundabout**  
Road sign maquettes (detail), Jock Kinneir and Margaret Calvert, circa 1960, Saint Bride Library

**11. Hand-made arrow**  
Road sign maquettes (detail), Jock Kinneir and Margaret Calvert, circa 1960, Saint Bride Library

Kinneir and Calvert's arguments were of a rational kind: sans serif letters and letter spacing had to be big enough to be read at speed, and mixed cases helped with legibility and word recognition; signs had to be big enough to hold place names and, most notably, graphics had to come in, in order to make the signs less wordy and more visual. In Kinneir's view, sans serif types also had a long English tradition, as the sans serif derived "...via [Sir John] Soane from the earlier Greek and Roman lapidary inscriptions"<sup>43</sup>. In the same vein, Gray also questioned the whimsical adoption of a serif type, Trajan, as the one and only good type that resolved all lettering problems. Both were aiming for legibility and quality, and their work had much to do with a sensible recognition of writing as an *as found*, revelling in the inventiveness and variety of local and lay responses<sup>44</sup>, which in no way meant that a clear, rational system could not be used for new challenges – such as the road. The main problem was seeing the problem as a typographic one, related to type *as set in the page*, rather than as one of lettering *on roads* – a different reality altogether.

This is the problem that the whole discussion on signage brought to the fore: not a typographic one, not one of identity, but how the road sign had become the locus of orientation. Ever since individual movement at speed was made possible with the bicycle, signage had to be put up in order to guide the way of the travellers. Same with the car: since the driver had control over the car's movement, as it didn't follow a set-up route, finding the way had to be done at the same time as moving. This ruled out wordy guides or, at least, diminished their use – and so Michelin evolved into a restoration guide. If knowledge of the route had first been held by a knowledgeable local, and had then been replaced by the guidebook and map, with speed, the orientation tool moved from person, to pocket, to the outside. The roadside sign came to replace both map and guide: in its perfected, systematised, coherent, and nation-wide version as designed by Kinneir and Calvert, road signs offered the information that was necessary



**12. Bad arrangement**  
Ministry of Transport Traffic  
Signs Manual, circa 1965,  
Saint Bride Library



**13. Better arrangement**  
Ministry of Transport Traffic  
Signs Manual, circa 1965,  
Saint Bride Library



**14. Preferred arrangement**  
Ministry of Transport Traffic  
Signs Manual, circa 1965,  
Saint Bride Library

to travel from one place to another: from place names, to directions, to map-like signs displaying in a glimpse the layout of the territory. The effectiveness of the system was furthered by the artificiality of the road's names, a specific language as codified by the Ministry of Transport: from then on, it didn't really matter where you were, but that there was a thread guiding you out by way of the accompanying road signs.

The road sign system replaced the map, or rather, adopted it and atomised it into a number of components that worked in cooperation, out of the drivers' reach. The sign was thus the place where the road network finally happened: after being partially realised in nineteenth and early twentieth century road maps, the road sign held together not only place names, but also the key to understanding the larger system. It offered both the view of the part and that of the whole *at the same moment*. What this system produced, and that the road network only partially achieves, was self-sufficiency, in the sense that all the knowledge needed to move within it was provided by the same system. This self-sufficiency has the self-contained character of a closed system, which in turn validated the principles that form it, and could be viewed without relation to other things. In other words, the road network (the conjunction of roads, cars and signs) became a new and artificial whole that existed by itself, almost in no relation to the supporting territory.

With this, the territory recedes into a secondary place as source of orientation. The moving subject's experience cannot be described or captured by traditional techniques<sup>45</sup>, as the moving observer is no longer standing at a comfortable distance in relation to the objects he or she is seeing (whether city or landscape), but actually passing *by* them at great speed, and therefore unable to measure the space in between. Orlando's disorientation (perception "chopped small"), however, was overcome by the establishment of the road network, with its helpful systematisation of names and signs. The atomisation of the map and its systematic location by the side of the road made the territory beyond it secondary: what became important is the place not in space but in the system. Road travelling affected experience by detaching orientation from the territory and re-attaching it to the artificial, atomised, systematic 'map'. Road travelling thus reconfigures both the way of seeing, by creating a moving observer that does not need space, and the knowledge of the outside, by replacing the very same outside with its double, the atomised graphic representation of it.

1 Virginia Woolf, *Orlando* (London: Penguin Classics, 1993), 211.  
 2 Ibid., 212.  
 3 Ibid.  
 4 Richard Oliver, *Ordnance Survey Maps: A Concise Guide for Historians*, Reprinted with minor corr (London: Charles Close Society for the study of Ordnance Survey Maps, 1993), 67. His parenthesis; citing 'Southampton Circulars' 25:6:1884.  
 5 Ibid.  
 6 Christopher I. Savage, *An Economic History of Transport* (London: Hutchinson & Co., 1959), 11.  
 7 The model for the development of roads and highways in eighteenth and early nineteenth century Britain was a particular form of 'infrastructure state', one where parliament encouraged road development and supported it economically, but was still at the service of private entrepreneurs for the upkeep of the roads. See Jo Guldi, *Roads to Power Britain Invents the Infrastructure State* (Cambridge, Mass.: Harvard University Press, 2012).  
 8 Joe Moran, *On Roads: A Hidden History*. (London: Profile, 2010), 9–10.  
 9 Discussions in parliament disputed centralised management by stating that it would not diminish corruption, or even that it was necessary at all. Guldi, *Roads to Power Britain Invents the Infrastructure State*, 141.  
 10 Engineers stated that particular, local governments were inhibiting better engineering. Ibid., 104.  
 11 Philip S. Bagwell and Peter J. Lyth, *Transport in Britain, 1750-2000: From Canal Lock to Gridlock* (London: Continuum, 2006), 39.  
 12 Guldi, *Roads to Power Britain Invents the Infrastructure State*, 155–174.  
 13 Ibid., 178.  
 14 Parish responsibility disappears in 1894, while the last Turnpike Trust is abolished in 1895. Coaches disappeared with the coming of the railway as well. At the beginning of the twentieth century, only local passenger traffic

was provided by coaches. Savage, *An Economic History of Transport*, 85–87.  
 15 It is not casual that their first guide was to the First World War battlefields: the *Illustrated Michelin Guides of the Battlefields* (1917 to 1938) were there for all the war veterans and soldiers' families wishing to visit them, for battlefields didn't appear on survey maps (as battles are ephemeral) and they weren't accessible by train (as before the battle they were only fields). Georges Ribeill and Judith Crews, "From Pneumatics to Highway Logistics: André Michelin, Instigator of the 'Automobile Revolution', Part I," *Flux*, no. 3 (1991): 16.  
 16 Contested between John Boyd Dunlop in 1889 and Robert William Thomson in the much early 1845. John Woodforde, *The Story of the Bicycle* (London: Routledge & K. Paul, 1977), 88–90.  
 17 It was the motorised version of the bicycle, the motorcycle (with a history running parallel to the manpowered bicycle, this is, from as early as 1830), the one that would prompt the invention of the internal combustion engine, later used in the car. Bagwell and Lyth, *Transport in Britain, 1750-2000*, 87.  
 18 Ibid., 92.  
 19 Savage, *An Economic History of Transport*, 93.  
 20 They almost had no interiors and protection from the elements came from the rider's clothing. Gregory Votolato, *Transport Design: A Travel History* (London: Reaktion, 2007), 76.  
 21 Savage, *An Economic History of Transport*, 93.  
 22 Ibid., 94.  
 23 Ibid., 149–151.  
 24 Maybury allocated one number to a road from beginning to end, and then another to each section, each combination designating a particular road segment. This number would be known for both central government and local authority and would work as common ground for both.

25 If in 1918 Eric Geddes imagined a Ministry of Ways and Communications in charge of roads, railways, light railways, canals, ports, air transport and electricity supply, this all-encompassing approach would be stripped off almost to the minimum in parliament. The 1919 discussions would take away ports, air, trams and the possibility of state-owned railways. See Bagwell and Lyth, *Transport in Britain, 1750-2000*, 73–76.  
 26 Michelin had the French Ministry of the Interior's map (1:100,000) traced and updated after a detailed questionnaire was answered by the engineers at the Ponts et Chaussées. He then produced a map at a scale of 1:200,000, folded and with cloth binding, which codified the material nature of roads. These maps were constantly updated. Ribeill and Crews, "From Pneumatics to Highway Logistics: André Michelin, Instigator of the 'Automobile Revolution', Part I," 15. Michelin had worked in the Map Service at the Ministry of the Interior.  
 27 Georges Ribeill and Judith Crews, "From Pneumatics to Highway Logistics: André Michelin, Instigator of the 'Automobile Revolution', Part II," *Flux*, no. 5 (1991): 8.  
 28 Ibid., 7.  
 29 In 1921, Michelin wrote four papers on the subject of the French and British road numbering problem addressed to the Ministry of Transport, proposing one for Britain.  
 30 Moran, *On Roads*, 58.  
 31 Citing the Royal Commission of Transport, Final Report, 1930, Cmd. 3751, p. 50 in Savage, *An Economic History of Transport*, 152.  
 32 Ibid.  
 33 Bagwell and Lyth, *Transport in Britain, 1750-2000*, 48.  
 34 Bagwell and Lyth argue that in the fifties, the Tory governments set out to undermine the emergent system proposed by Labour governments after the Second

War World. If the latter had managed to nationalise the railways (British Railways) and set the British Transport Commission (BTC, in charge of planning and executing an integrated transport system), the Tories, by benefitting the road lobby (car manufacturers, lorry drivers' unions, motorway builders and local government) over, for example, railway modernisation. See *Ibid.*, 201–202.

35 Thomas Zeller, *Driving Germany: The Landscape of the German Autobahn, 1930-1970* (New York & Oxford: Berghahn Books, 2007).

36 Herbert Spencer, "Mile-a-Minute Typography," *Typographica* 4 (1961).

37 "The new age began with the Industrial Revolution. Not only did that necessitate the creation of a new architecture by producing new materials and methods of construction, and by causing the demand for new sorts of industrial building, but indirectly it led to the extension of education and the present unparalleled condition of universal literacy." Nicolette Gray, *Lettering on Buildings* (London: The Architectural Press, 1960), 87.

38 Spencer, "Mile-a-Minute Typography," 3.

39 Herbert Spencer, "Introduction," *Typographica* 4 (1961): 1.

40 Kinneir had come into contact with David Alford, one of the architects of Gatwick airport, and had been commissioned the design of the airport's signage (Kinneir had previously worked on the signage of the Festival of Britain). Colin Anderson, chairman of P&O shipping, after seeing the Gatwick job, hired Kinneir to do his company's baggage labelling. Some time after, Anderson would be made chairman of the Advisory Committee on Traffic Signs for Motorways and that's how he appointed Kinneir as designer. Moran, *On Roads*, 62–63.

41 See *Ibid.*, 62–68. See also Simon Garfield, *Just My Type: A Book about Fonts* (London: Profile Books, 2010), 148–159.

42 Moran, *On Roads*, 68. David Kindersley appropriately designed the type featured in the British Library portico.

43 Jock Kinneir, *Words and Buildings: The Art and Practice of Public Lettering* (London: Architectural Press, 1980), 58.

44 Both *Words and Buildings* and *Lettering on Buildings* use as much text as photographs to put forward their arguments. Photographs are often of lay examples, and so 'good lettering' in most cases refer more to the appropriateness and inventiveness of the case rather than to the adjustment to an inexistent code of good lettering.

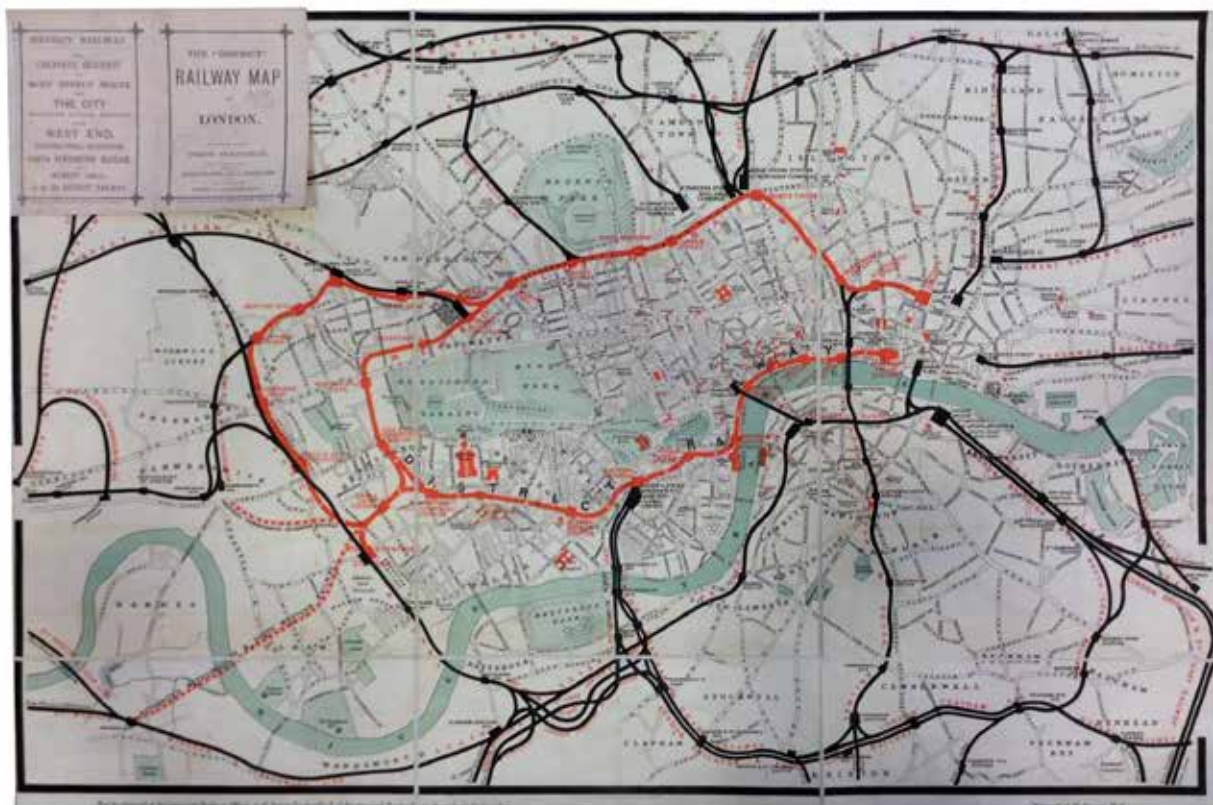
45 As argued by Robert Venturi and Denise Scott-Brown in *Learning from Las Vegas*.

## Under the ground

A 1874 map shows London from Hammersmith in the West to Stepney in the East; Islington in the North and Brixton in the South. These are lonely names set out in block capitals on the white sheet of paper, amid a few straight double lines indicating major roads. A rough map of the city occupies the centre of the sheet, with river and parks highlighted in aqua green and important buildings set out in red. Sticking out are the thick bold lines representing railways: twelve black lines arrive at their terminus stations after swerving, branching and joining others. In red, another thick line sews together all the termini: it's the District railway, almost a perfect closed loop if it weren't for the gap between Mansion House and Moorgate. Both black and red lines are punctuated by thicker rectangles denoting stations, giving a scale to the railway lines: the amount of stops they have speaks of the density of the demand for trains, be it national or metropolitan. This map seems utterly contemporary with its bold graphics, its emphasis on connections and the visual primacy of the network, yet the London it shows was decidedly Victorian. The desire for further connection was just starting to be honed: London's interior, untouched by the railway, had just become matter to be furrowed.

By the mid-1800s, life not only happened on the cobbled surface of the city. In 1849 Dr. John Snow had demonstrated that cholera spread not through air but by contaminated water, and the successive public health crises called for a definitive solution. The problem was solved by digging and building sewers over the second half of the century, and so the underground appeared if not in the collective imagination of the people at least in their everyday life. So when the metropolis was besieged by the railway, pressure over the untouched interior mounted: the technology of speed and the almost instant availability of the territory outside the city contrasted with the slow and cumbersome traffic of the Victorian city. An internal railway was needed, and so some people thought of using the air, such as Joseph Paxton's extraordinary project for the Grand Girdle Railway. Reason, however, veered towards the underground, and it was the interior of the city's interior the one that would become the place for





1. District railway map  
E. Stanford, 1874,  
British Library

metropolitan movement. This spatial-less characteristic (travelling within matter rather than in open air) is fundamental to the constitution of a mode of transport that completely reconfigures the idea of moving in the city. With the Tube, movement in the city ceases to be something that happens in space and becomes one that takes place in matter. The autonomy of the underground railways happens not only in terms of strata, but is furthered by a coordinated electrical supply and, in the twentieth century, by a centralised administration. As the Underground becomes a system that escapes the laws set for the ground, Harry Beck's pocket Underground map becomes the only way to know it – and the knowledge it puts forward is one where diagram and Tube are indistinguishable from one another. The Underground is thus constituted not only as a system or a network in conceptual terms, but as an actual city-size machine.

It all started with some cautious digging. John Fowler, the engineer for the Metropolitan Railway, designed the first underground line with a cut-and-cover system. This method, however, was not straightforward, as underground railway construction was subjected to the same laws as regular railways, requiring the purchase of all property they passed under<sup>1</sup>. The Metropolitan Railway's first section, from Paddington to King's Cross, was easy to realise as it dug under the New Road, but from King's Cross down to the City, it needed to pass under many properties. The operation became expensive and time-consuming, so the line opened a year later than expected. The cost issue was partially overcome when James Henry Greathead took charge of the engineering of the City of London & Southwark Subway Company as the project was approved by parliament in 1884. Greathead proposed a tunnelling method inspired in the work that Peter William Barlow had used for the Tower Subway in 1869, which implied the use of cast-iron self-supporting cylindrical segments lining up the walls of the excavation as it took place<sup>2</sup>.



**2. Cut and cover method  
in South Kensington**  
1866-67, Museum of London



**3. Cut and cover method  
near Bayswater**  
1866-70, Museum of London

More important than the technological advance was the legal one: in 1892 the parliamentary committee considering four new lines recommended that companies should not be forced to buy the properties they passed under, but rather that they had to negotiate a 'wayleave' with the proprietors – a much cheaper solution. On top of that, tunnelling under existing roads would be free of charge, which involved a major reduction of the cost of new railway lines<sup>3</sup>. These two changes in the way the metropolitan railways could be laid and built had an immediate consequence, in terms of the relation between the underground railway and the city: starting in the last decade of the nineteenth century, the underground grew increasingly independent of the city above. The layout of the lines still tended to replicate the streets above, but the Greathead tunnelling method meant no disruption to the city above during construction and therefore left no physical imprint on its fabric. Both technology and legislation eased the way for the appropriation of the underground, with private lines opening almost every five years: in 1863 the Metropolitan Railway opened, connecting Paddington with Farringdon, followed by the District Railway in 1868, its circle being closed by the eventful Circle line in 1884, then the opening of the City & South London Railway in 1890 and, finally (for the nineteenth century), the Waterloo & City in 1898. The twentieth century saw the opening of the Central line, the Bakerloo line, the Northern line, and so on.

From its onset, the underground railway reigned over the lower strata of the city, such as Victorian sewers and water pipes, lost rivers and new tunnels under the Thames. It might have been an imperceptible layer of technology for the city stroller, but the Tube caught, from very early on, the attention of both public and science. Just as the incandescent light bulb was the solution to a domestic problem and an early pinnacle of research into electromagnetism<sup>4</sup>, the Underground's technological development was also the materialisation of the Enlightenment, but at another scale. As electromagnetism evolved as a field, conceptual and material advancements allowed for an expansion of scope: battery and light bulb gave way for research and



**4. Pedestrian tunnel under the Thames**  
Circa 1869, London  
Transport Museum



**5. East London Railway tunnel**  
1870, London  
Transport Museum

development in the generation and uses of continuous and alternating current, steam engines, the invention of the first motors and electric traction. Electromagnetism ceased to be a field of enquiry for natural philosophers and entered the realm of production, accelerating its development. Just as Newton's theories were put down to earth by mapmakers such as Roy, or instrument makers such as Ramsden, the work of Volta, Ørsted, Ampère, Arago, Faraday and others found its practical realisation in the late nineteenth century<sup>5</sup>. It is the constitution of electricity as a field of *engineering* what installs the spirit of the Enlightenment into every aspect of modern life.

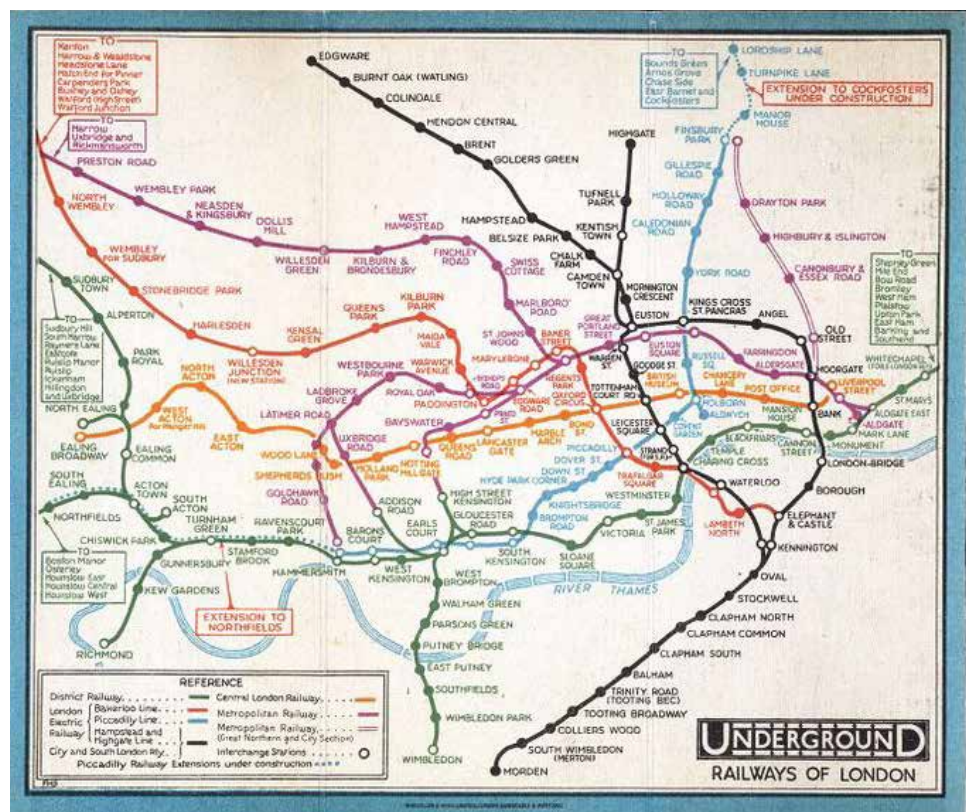
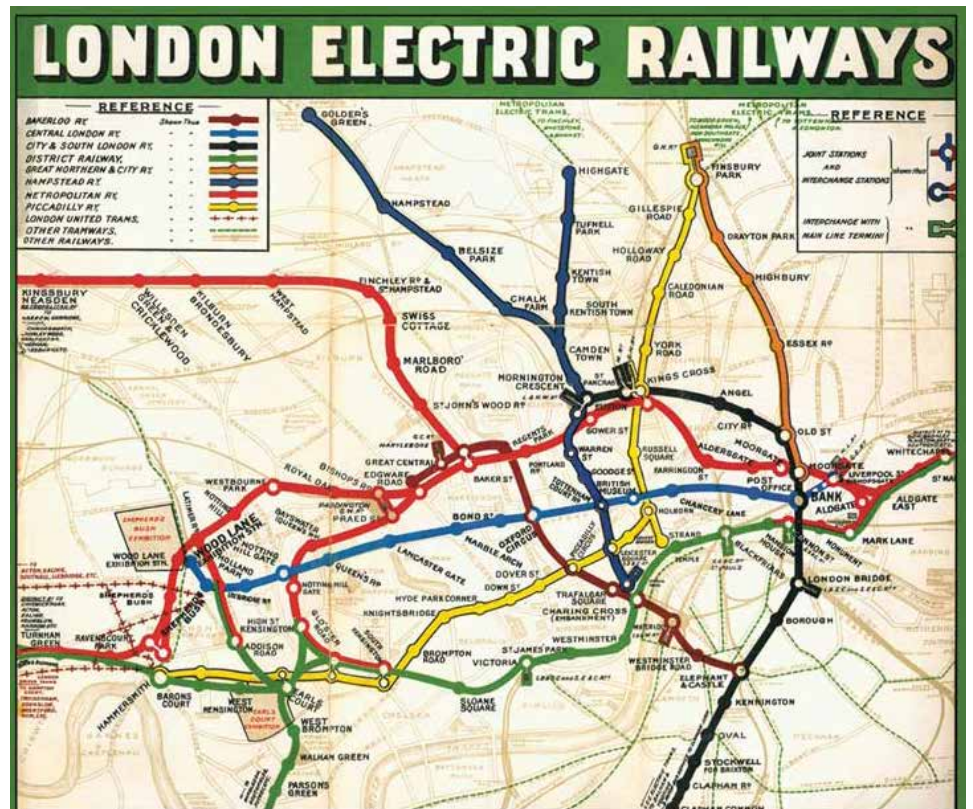
The electrification of the London underground railways responded to a very straightforward problem. The trains could not work by steam engines: no matter how tunnels and stations were designed, the combination of smoke and subterranean space did not go well. By 1897 the Board of Trade dictated the end of steam locomotives on the underground, and so each underground railway company set off to find a way to haul its rolling stock. The City and South London Railway was the first to have electricity as motion power, and the Central Line followed. They both used a third rail as supplier of electricity to move their electric locomotives, just as it had been heralded in 1883 by a section of a railway line to Brighton<sup>6</sup>. By 1905-1906 the last steam engines hauled trains in the Tube: all companies had adopted electric traction, establishing individual power plants to supply each railway<sup>7</sup>. The live track had come to light things up, distributing the electricity generated in each power station to every train moving on the underground tracks. If before electricity each train generated and consumed its own traction power, after it trains moved in a powered medium.

Charles Parsons' improved steam turbine of 1910 was fundamental for this change, as his turbine implied a major increase in the production of horsepower, even generating it in excess<sup>8</sup>. Electrical supply quickly reached levels fit for the requirements of the modern metropolis and its infrastructure. The excess of electricity meant that in between the two wars a government committee recommended that all suppliers of electric power should be brought under a central authority. This resulted in the creation of the Central Electricity Board in 1925. One of the main functions of this Board was to create a national grid that would put all generating stations in contact through a transmission network, implying a standardisation of frequency – up to then, there had been seventeen different frequencies and eighty undertakings operating on other than fifty cycles. The 1926 Electricity Supply Act regulated this<sup>9</sup>, and the construction of the national grid became an eight year plan whose aim was assuring “universal availability of electric power throughout the country<sup>10</sup>.” Any electrical device, small or large, of domestic or metropolitan scale, effectively got to participate in the unique and all-encompassing national electric network. However mediated the relationship between supplier and specific circuit might be, communication with a portion of electric current essentially meant integration with the totality of electric flow in the country.

Electrification meant that separate underground companies came into a relation with each other through their electricity demands. It also meant that their administrative independence would be challenged over the years: the constitution of the Underground as one single transport entity, although logical, took some time to realise as the resistance to centralisation seems characteristic of any British undertaking. Like the railways, the Underground began as a series of private ventures, often in competition with each other: each line had its own tariff, technology and identity, all essential in their advertising. By the end of the nineteenth century, however, financial pressures resulted in the takeover of the District line, the projects for the Baker Street & Waterloo Project (later Bakerloo) and the Piccadilly lines by the company commanded by the American Charles Yerkes. His influence was felt in the battle for the electrification of the Inner Circle line (which combined two independent lines, the Metropolitan and the District), where Yerkes pushed for a system used in the metro in Chicago<sup>11</sup>. Yerkes had founded the Metropolitan District Traction Company in 1901 specifically to pursue the electrification of the District line (both to build the power station and to electrify the line), but in 1902, due to the expansion of its holdings, he changed the company to the Underground Electric Railways of London Ltd (UERL). This company, managing three lines, led to a general standardisation in the design of stations, rolling stock, signalling and other equipment, and setting a standard for their electrification<sup>12</sup>. The UERL not only controlled underground lines, but also trams and buses – the latter formerly owned by the London General Omnibus Company, later called the London Combine when merged with the underground transport<sup>13</sup>. In the early 1900's, the UERL took over the City & South London line and the Central line, becoming one of the two major controllers, together with the Metropolitan Railway line, which also ran the Great Northern & City.

The UERL standardised its material components (trains, stations, equipment and power), and pushed for a standardisation of the underground railway's identity. The role of Frank Pick was fundamental: he joined the UERL in 1906 and in 1908 he was put in charge of publicity, traffic promotion and development. Already in his first year in that post, he commissioned the map that showed all underground railway lines in a coordinated way, regardless of ownership. This map, which adopts the colour code already seen in some of the main railway lines maps, was the first free map available to customers showing the underground railways as a single system, even if they were still independent. Pick's dictum for this map was that it had to show routes and services rather than being topographically accurate, marking a departure from existing ways of depicting the services<sup>14</sup>. Pick's role regarding the development and establishment of an aesthetic identity in the UERL's lines also





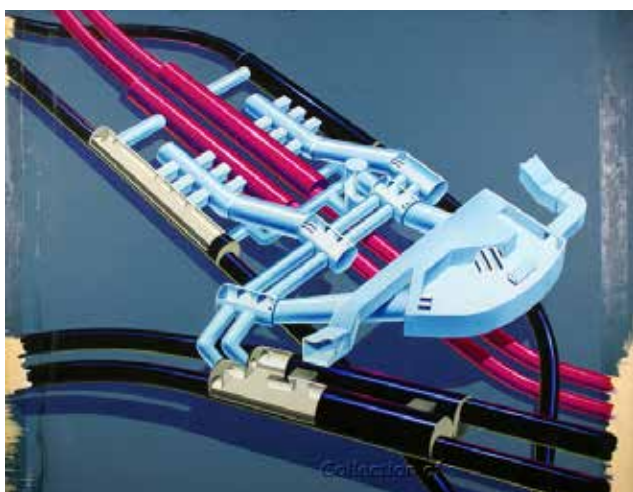
6. London Electric Railways, 1906

7. Underground Railways of London F. H. Stingemore, 1926



involved commissioning a large amount of publicity posters, a signature typeface (Edward Johnston's Underground) and the bull's eye logo. The UERL, and Frank Pick especially, are thus the nucleus of the centralised management of the Underground: eventually, in 1933, the London Passenger Transport Board (LPTB) was created as a single public corporation in charge of buses, trams and all underground lines and Frank Pick became its chief executive. LPTB would then be nationalised in 1948.

Common administration was thus the last step in the constitution of the Underground as an autonomous system, as already tunnelling had allowed for spatial independence and electrification for participation in a standardised way of powering the trains. The experience of this autonomous system required a manual, for as the subject crossed the first threshold and entered into the Underground, he or she ceased to see the city: staircases, ticket halls, lifts, escalators, more halls, platforms and then tunnels made the familiarity of the city above recede in each step down. The subject's normal reference points were left behind and, to add to his or her disorientation, there was no way of grasping the whole, as the Underground was nothing but a buried interior that could only be glimpsed through partial, sequential views. On top of that, while moving, there was nothing to see: the dark tunnels offered no landscape and so an early Central and South London Railway carriage even considered only small opaque windows, a claustrophobic design that did not last<sup>15</sup>. So the 1908 map was the first aid showing what was happening below ground and making it available to the Underground's users<sup>16</sup>. In 1910 Frank Pick commissioned the architect Max Gill (brother of Eric Gill, creator of Gill Sans among other typefaces) to produce the Wonderground maps, which he did until 1932. His maps, in line with the Arts and Crafts tradition of which he was part, are decorative illustrations of London in bold colours and nostalgic aesthetics, filled with "historical references... humour and play upon etymology and topical illusions<sup>17</sup>." These posters showing a detailed, wonderful above ground were intended



**8. Euston Underground station**  
(artwork for poster),  
E Barker, 1967, London  
Transport Museum



**9. South Kensington Underground station**  
(artwork for poster),  
E Barker, 1973, London  
Transport Museum



10. Wonderground map  
Max Gill, 1915,  
British Library



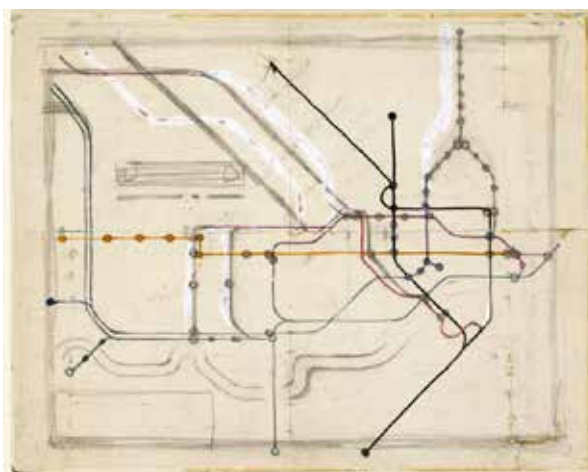


11. London  
Underground map  
Harry Beck, 1933,  
Victoria and Albert Museum

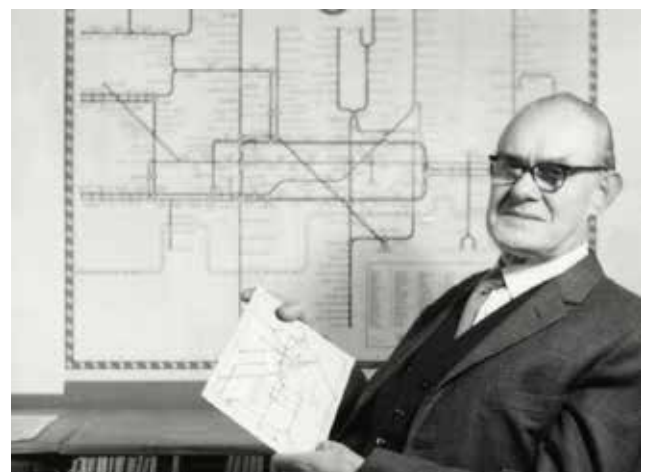
for publicity rather than practical use, and so in parallel to them Gill also produced maps showing the underground network – no city, no river, just the lines under ground. By 1925, the map designed by in-house publicist and personal draughtsman to Frank Pick, Fred H. Stingemore, adopts some of the graphic clarity introduced by Gill but continued to be topographically accurate. By 1926 the Thames was brought back into Stingemore's map to give a rough indication as to the situation of the swerving network.

Against what had been thought up to then, the way to familiarise people with the Underground was not in topographically accurate maps, or in anecdotal and picturesque attempts at integrating what was below with what was above. The one piece that achieved a seamless integration of Underground and city was Harry Beck's 1933 Tube map. Beck's map sheds any topographical reference apart from the river and instead presents a diagrammatic view of the whole of the Underground<sup>18</sup>. Historians dispute the origins of the map: some say that it was inspired by electrical circuit diagrams, or even that they were created while drawing one. Others propose that Beck must have been influenced by engineering drawings in general, with which he would be acquainted through his work in the signal engineers' office. Finally, some say he was influenced by the line diagrams already displayed inside the carriages since the late 1920s<sup>19</sup>. What is certain is that Beck (and the rest of the Underground engineers) moved amid the *diagrammatic environment* of engineering.

If the engineering profession was born out of military surveying practices in Enlightened France, and therefore, its immediate application was civil engineering – that is, mainly construction – soon enough engineering came to encompass any practice that involved the use of mathematics and science for the invention of new devices, whatever their scale. This was secured by the in-between step of drawing: Gaspard Monge established descriptive geometry as central to the education of engineers in



**12. Preparatory sketch**  
Harry Beck, 1931,  
Victoria and Albert Museum

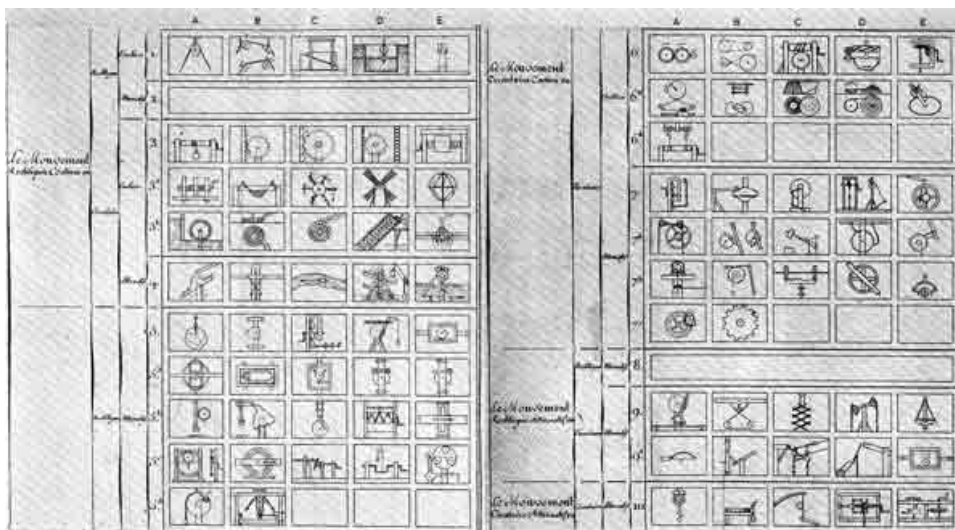


**13. Harry Beck with maps**  
Ken Garland, London  
Transport Museum

1795, making this step, geometric, but also algebraic, the key to the engineering practice. Drawing not only was a means of communication between engineer and constructor (as it is between architect and builder), but also the only way in which the engineer herself can figure out how her invention, machine or otherwise, works, the only way to express what it *does*. Drawing is where engineering takes place: it is where the idea of the new is first seen, where the laws of physics are put to the test (thanks to geometry) and where the instructions for its construction in real life are stored. Jean-Nicolas-Pierre Hachette, a student of Monge, wrote and taught the *Traité élémentaire des machines* (1811), where he depicts and classifies ten types of machines that transform movement of one kind into another. In the *Avant-Propos* of his *oeuvre*, Hachette cites the physicist Amontons to support the need for his *Traité*: “Le grand usage que tous les arts sont obligés de faire des Machines, est un preuve convaincante de leur absolue nécessité (...)”<sup>20</sup> and states that the Treatise’s aim is to “analyse, classify and make known the Geometric and Mechanic principles that are the base for their construction.”<sup>21</sup> The *Traité*, heavy on theory but supplemented with beautiful drawings of the main machines, of three types: hydraulic, with cogs and related to construction, is a work that sits in between the physics treatise and the applied sciences manual:

*Our Treatise (...) can be considered like a much-needed introduction to the studies of this science [Mechanics]. Same as with Statics, we ready our spirit to grasp the generalities of the principle of virtual speed, by applying this principle to several simple Machines; in the same way the study of general laws of movement will be far less abstract once we have observed the application of these laws in a certain number of Machines.*<sup>22</sup>

Hachette articulates the physics behind machines such as the water-column machine, the hydraulic Béliér or the hydraulic press, together with several cogged machines and construction pulleys, through explanations that include the mathematical formulas that sustain them, and supplemented with the technical drawings that describe them. As a result, Hachette’s *Traité* heralds what would surpass



**14. Diagrams of machines**  
from Jean-Pierre-Nicolas  
Hachette's *Traité Élémentaire*  
*des Machines*, 1819

the civil aspect of engineering as its main field: the production of mechanisms, devices, artefacts – in other words, things. The reduction in size of the object to be represented with a drawing meant that, finally, the whole of the engineer's problem could be captured in one look, overcoming many of the surveyors, engineers and architects' difficulties. The problem was finally self-contained.

Electrical engineering, however, had moved from the very small to the very large, with the Underground pioneering large electrical systems, and producing a consequent development in both transformers and switchgear. The latter, which controlled the current in a circuit, both of opening and closing a circuit within normal functioning and in an emergency, gained more and more importance as magnitudes increased. In early power stations, circuits were controlled by open knife switches, hinges that allowed a metal knife to be put into contact with a slot (or be removed from it) by flipping it up or down. The switch itself was live, that is, current passed through its metal parts when the knife entered into contact with the slot, and only its handle and base were insulated<sup>23</sup>. In the twentieth century, improvements had to be made as higher voltages were being produced, thus the introduction of magnetic blowouts to extinguish arcs, where before it had only been air. Together with this, the switchboard became the central piece in a power station: the major modification, introduced from the 1900s onwards, was the adoption of dead front switchboards, that is, a board where no live metal is accessible, and where switches had to be activated through remote mechanical control<sup>24</sup> – with the switches themselves being housed in a walled space behind the switchboard. In other words, the live electrical circuit was removed from its controlling board – space and materials ('dead' ones, such as brick) were placed in between operators and system. The switchboard itself thus became a display, a façade for the system lying behind: it is a *representation* of the system housed behind it, but can, and must, actually be operated. Operation does not imply material access to the current itself, but only to switches and triggers that remotely operate the live system behind.



**15. Electrical control panel**  
1938, London Transport  
Museum, Acton Depot



**16. Generator control panel**  
circa 1932, London Transport  
Museum, Acton Depot



**17. Circuit breaker from**  
East Finchley sub-station  
1938, London Transport  
Museum, Acton Depot

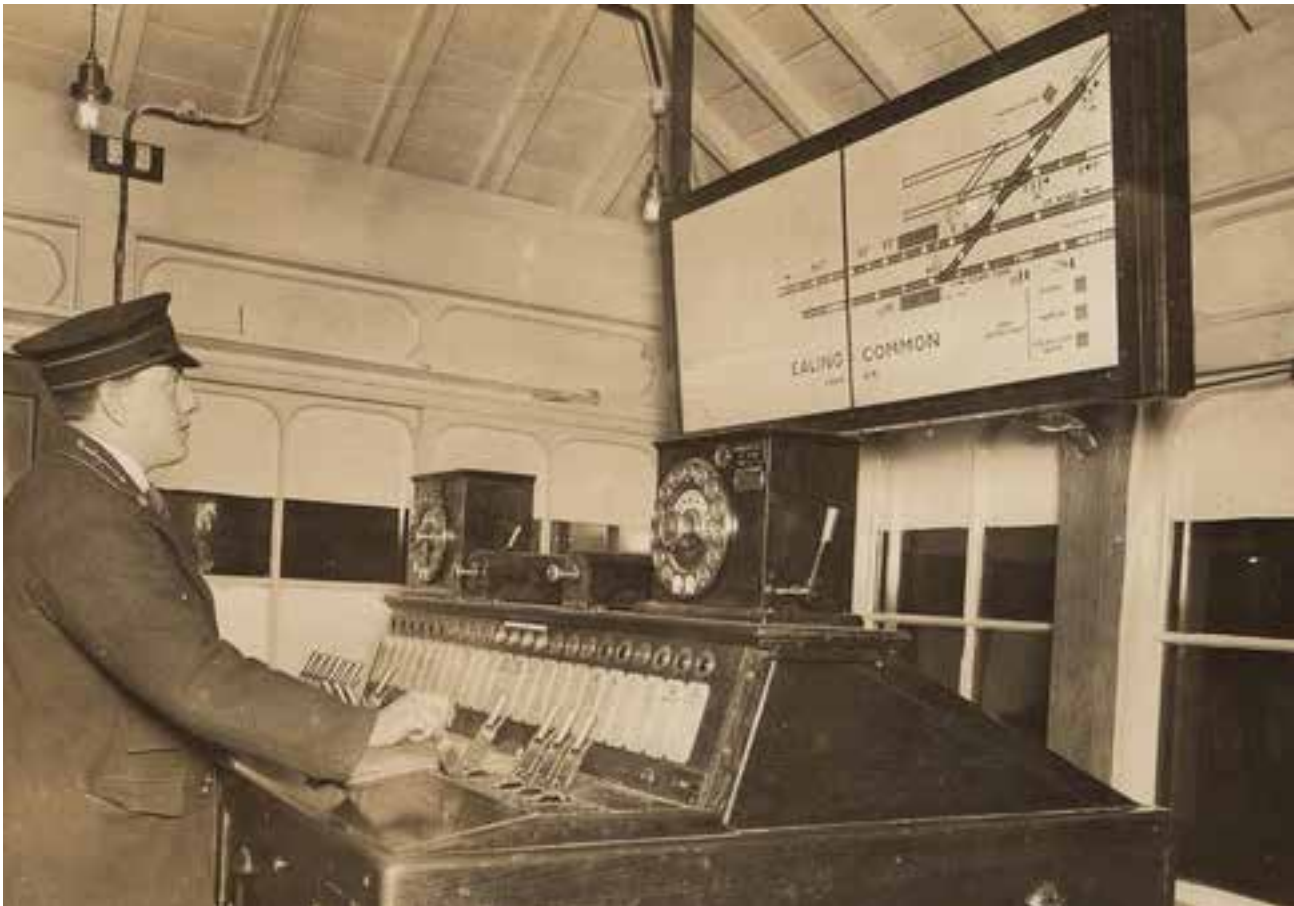




18. District railway guard  
standing by a track  
in Hammersmith  
Topical Press, 1931,  
London Transport Museum



19. Signal with right arm  
Topical Press, 1931,  
London Transport Museum



**20. Staff member operating  
mini-lever signal frame  
at Ealing Common,  
Topical Press, 1925,  
London Transport Museum**



A similar change had occurred to signalling, the field in which Beck operated as technical draughtsman in the years before the Tube map<sup>25</sup>. In the pre-electrification stage, tracks were administered through timetables and mechanic devices such as levers controlling points or switches, together with signals: signalmen had to be out in the field, keeping track of the trains' schedules in order to activate points and provide clearances. In the early electrification phase, levers were moved from the side of the railway to an overlooking signal box or cabin, from which the signalman could operate the levers activating points, the box's height offering a commanding view of the junction. By the 1920s, electrification allowed for the remote operation of both points and signals through signal frames, where compact levers activated the mechanical interlocking gear housed within the wooden cabinet<sup>26</sup>. The reduction in size of the levers permitted the managing of more points in less space; together with this, the use of electronic diagrams reproducing the movement of the trains on the tracks made it possible to dispense with any direct view of the junction. And so the operator in the signal box at Ealing Common, on a Tuesday morning in 1925, has his hands on the levers and his eyes on the flashing lights of the diagram<sup>27</sup>. The cabin's windows open to a pitch-black exterior, which has become irrelevant anyway: as humans are expelled from the action into a box, the diagram replaces reality.

In the 1920s, the diagram was therefore not only a graphic language exclusive to electrical engineers in the planning of circuits, but also an operative representation of the railway system. Together with the significant changes in the way in which electrical systems worked, such as with the systematisation of all electrical supply into a national grid, Beck's environment was one of systems – and diagrams operating them. His map is then just sensibly tuned to the characteristics of its subject matter: Beck doesn't try to hide the Underground's inhuman qualities but, on the contrary, brings them forward by recognising that it works as a self-contained machine. He does this by showing the underground as a closed and finite system (it shows the whole of the network in one sight), by depicting every component as equivalent to



**21. Ealing Broadway signal cabin, with original signal frame and switching equipment in use**  
Walter A Curtin, 1951,  
London Transport Museum



**22. Signalman operating a miniature lever frame, while watching track diagram headed "Camden Junction"**  
Topical Press, 1924, London Transport Museum

all the rest, for example, by evening out distances between stations<sup>28</sup> and, finally, by standardising the points of connection between different lines. The diagram portrays just the specific spatial sequences, which are simplified into a basic diagram indicating connection or absence of it. This drawing thus parallels the kind of systematic thought allowed for by electric systems: that the system is closed and finite makes it quantifiable (just as the national grid made all the possible electrical production known); that its parts are evened out and standardised allowed accessing the system from whichever part (therefore permitting the distribution of all the possible electrical current – or people – no matter where it was being produced and/or being needed); and that connections are standardised simplifies the functioning of the system into a binary option for each point, very much like a circuit. The most important contribution of Beck's diagram is therefore not the graphic one (as in 'graphic design') but that it captures the kind of systematic thinking that allows to communicate the workings of the Underground to the public, making it available at a glance.

This diagram of the Underground was immediately successful with the public: the first run of the pocket map in January 1933 was of 750,000 copies; in February 100,000 more copies were printed. As the public adopted it, the initially reluctant Underground authorities finally came to recognise its value<sup>29</sup>. Its success, often shadowed by too superficial a reading of its design qualities<sup>30</sup>, is based on it being able to give an operative image of the whole of the system in a language that was easily accessible to the public. The public's literacy is often underestimated, but for certain the metropolitan subject wasn't removed from technology or from a version of the same environment that surrounded Beck. The twentieth century public was already used to ideas of networks of movement: they were present in their everyday lives, from the railway's iron network to the alphanumeric system of roads – but also the telegraph, telephone, electricity and so on. These were not necessarily comprehended in their totality, but *using* them gave the subject



**23. Control desk in the signal cabin at Farringdon**  
December 1956,  
London Transport Museum



**24. Interlocking machine**  
1957, London  
Transport Museum

at least a notion of their constitution and function. The Underground, as shown by Beck's map, was just another of such systems, a machine operating below the surface almost without any regard for the physics of the world above.

With the development of electrical and pneumatic engineering, more complex machines replaced lever frames and the administration of the railway became more remote<sup>31</sup>. In the mid-fifties, the signalman sat in front of a desk, after years of outdoor waving, lever pulling and finally mini-lever pushing. Safely seated at the Farringdon desk<sup>32</sup>, he could push buttons and look at his illuminated diagram (which nonchalantly oversteps in front of the window), controlling through the 4 feet long panel the 67 signals and 54 pairs of points linked to it. This desk operated an interlocking machine, which activated a system of compressed air to move the levers that controlled points and signals: if the air supply failed, the signalman could go in person to the Interlocking Machine Room to operate the levers<sup>33</sup>.

All these contributed to the installation of the systemic mind and its specific demands for knowledge. The Tube map, together with the experience of travelling by Underground, had a radical impact in the way of seeing and therefore in the knowledge of the city it provided. The metropolitan subject travelling by Tube is one that does not see at all. Because he or she is under ground, there is nothing to see: interiors are dark and the exterior does not correspond to what goes on on the inside. So if the observer constructed by Western culture since the Renaissance was one that stood in space and that could establish a position for herself by measuring distances, the Underground commuter cannot, for space, as established by tools such as architectural plans and scientific maps, does not exist. Movement happens not in the city, but below, and so context, landscape and landmarks are lost – or reduced to a name in a list. The map builds a fiction regarding proximities of place names that does not correspond to reality: distance and measures are thus not taken from material reality, but are contained in the diagram. Knowledge itself is relocated to the diagram: to move with the Underground the diagram is enough, there is no need to actually *know* the city above. The tube map thus creates a double of the city, but a double that is often in conflict with the real, material city. The possibility the Tube map opens, however, is that in its diagrammatic display of the totality of the system, all possible journeys are contained, just as all the electric current present in a system is available in a diagram of the national grid – just needing to be administered and channelled. The drawing ceases to be just descriptive and starts becoming prescriptive: Beck's diagram becomes the Journey Planner.



- 1 David Bownes, Oliver Green, and Samuel Mullins, *London Underground 150: Keeping London Moving, 1863-2013* (London: Allen Lane, 2012), 24.
- 2 Ibid., 62–65.
- 3 Ibid., 71.
- 4 See the fascinating Giuliano Pancaldi, *Volta: Science and Culture in the Age of Enlightenment* (Princeton: Princeton University Press, 2005).
- 5 See Percy Dunsheath, *A History of Electrical Engineering* (London: Faber and Faber, 1962). Alessandro Volta coined the term ‘current of electricity’ when he found out that when two different metals enter into contact, they produce a continuous current of electricity. This led him to pile the two metals, separated with a moistened phibrous substance and so invented the Voltaic pile – the first battery. This discovery was communicated to the Royal Society on 18 September 1899. Ibid., 30–31. According to Dunsheath, Hans-Christian Ørsted, André-Marie Ampère and François Arago are behind one of the greatest impulses to electromagnetism: succinctly, Ørsted proposed the closing of the battery circuit; Ampère enunciated the laws that Ørsted’s experiments had hinted at; Arago, famous for his Disc, is the discoverer of magnetic induction by an electric current (this is, that many materials can be electrified). Ibid., 55–61. On a side note, Arago also participated in the measurement of the Dunkerke-Barcelona meridian, along Delambre and Méchain, and his greatest contribution perhaps is the polarisation of light - man of many talents. Michael Faraday furthered these three men’s contribution with his experiments on the generation of the first continuous current by induction (and many other contributions, especially in the associated field of chemistry). Ibid., 89–97.
- 6 Dunsheath, *A History of Electrical Engineering*, 191–192.
- 7 Bownes, Green, and Mullins, *London Underground 150*, 55–56.
- 8 Dunsheath, *A History of Electrical Engineering*, 196–198.
- 9 Ibid., 202.
- 10 Ibid., 203. citing Sir Archibald Page
- 11 Bownes, Green, and Mullins, *London Underground 150*, 81–85.
- 12 Ibid., 87.
- 13 Ibid., 92.
- 14 Claire Dobbin, *London Underground Maps: Art, Design and Cartography* (Farnham: Lund Humphries in association with London Transport Museum, 2012), 15.
- 15 Bownes, Green, and Mullins, *London Underground 150*, 68.
- 16 The 1908 Underground map is of an unknown author and was printed by Johnson, Riddle and Co Ltd. See Dobbin, *London Underground Maps*, 63.
- 17 Gill, MacDonald, ‘Decorative Maps’, *The Studio: An Illustrated Magazine of Fine and Applied Art*, vol. 128, no. 621, Dec 1944, 166, cited in Ibid., 58. Dobbin reviews Gill’s Wonderground posters in her book’s first chapter. They were mainly made to encourage travelling by showcasing the attractions of London.
- 18 For a detailed study of Beck’s map, the history of its predecessors, first-hand information about the design process and a follow-up of what came next, see Ken Garland, *Mr Beck’s Underground Map* (Harrow Weald: Capital Transport, 1994).
- 19 Dobbin, *London Underground Maps*, 75.
- 20 Jean-Nicolas-Pierre Hachette, *Traité Élémentaire Des Machines* (Paris: Mme V. Courcier, Imprimeur-Libraire, 1819), vi.
- 21 Ibid., v. My translation.
- 22 Ibid., xxii. My translation.
- 23 Dunsheath, *A History of Electrical Engineering*, 205.
- 24 Ibid.
- 25 See the collection at the London Museum of Transport, especially the contents of the Acton Depot, some of which can be found here: <http://www.ltmuseum.co.uk/collections/depot-discovery>
- 26 Unknown maker, “Westinghouse Power Lever Frame ‘York Road,’” circa 1906, 1993/5, London Transport Museum, Acton Depot.
- 27 Unknown photographer, “Interior of Signal Box at Ealing Common Showing New Mini- Lever Signal Frame with Staff Member (photograph),” 1925, 2002/18134, London Transport Museum, Acton Depot., b/w photograph. This picture is part of a 4-day series recording the conversion of signalling and points to electricity.
- 28 Stations in the centre are closer than those in the periphery, yet they are depicted as having similar distances among them.
- 29 Garland, *Mr Beck’s Underground Map*, 19.
- 30 Such as “[p]erhaps the answer [to why people took so quickly to the map] lies in the fact that it was so obviously useful; people couldn’t resist its helpful character, appreciating instinctively that its designer, himself an ordinary, Tube-travelling commuter, was concerned for *their* information needs and not for novelty for its own sake.” Ibid.
- 31 See the series about Earl’s Court Station, starting with Topical Press, “Earl’s Court Underground Station (photograph),” October 26, 1933, 2002/13472, London Transport Museum. Continues with LTM 2002/13471, LTM 2002/13470, LTM 2002/13467, LTM 2002/13466.
- 32 Unknown photographer, “Control Desk in the Signal Cabin at Farringdon (photograph),” December 17, 1956, 1998/89225, London Transport Museum.
- 33 Unknown maker, “Interlocking Machine,” 1957, 1993/16, London Transport Museum, Acton Depot. It is called ‘interlocking’ because “[t]he moving parts of the machine are physically connected so that it is impossible to set up conflicting routes and signals. If a fault occurs in the control system, the mechanical interlocking provides the final line of defence.” (From <http://www.ltmcollection.org/engineering/objects/object>.

## In the street

If in 1933 what moved underneath London could be captured in a single diagram, by 1936 its surface was best recorded and disseminated in an atlas: a single folded sheet for the Underground and 95 different maps in the atlas for what was over ground. 1936 was the year WH Smith reluctantly started selling the A to Z London Street Atlas, from the Geographer's company, which quickly became the most popular way-finding aid in London in the twentieth century<sup>1</sup>. The A to Z's success was that it brought the knowledge of the metropolis up to date: previously, all other maps (including those produced by the same company behind the A to Z) were based in 1917 and 1919 Ordnance Survey maps and were all failing to incorporate recent changes. The A to Z updated that information by using borough and county surveyors' records, and added additional data, like street numbers. Its list of streets claimed to catalogue every street in London, coinciding with the London County Council's first attempt at avoiding name repetition: in this process, the LCC changed the name of 2,000 streets in London. All the updating and proofreading was done singlehandedly by Phylis Pearsall, while the drawing was realised by J. Duncan.

More than its accuracy, the A to Z's innovation was the kind of access to the city it gave. The A to Z was no longer an atlas of maps, but a *book* about *words* (from a to z): the number of pages devoted to street names easily surpasses those dedicated to maps. No longer did the stranger need to hunt for a street in a packed map, peering over it as if she is seeing the city from above; no longer did the subject need to trace a route with her finger over the scaled drawing to rehearse a walk; no longer did she need to commit to memory the said journey in order to replicate it in the city. With the A to Z, you looked for the street on the list, used the code to find the adequate page, located the street using the grid and then looked for the nearest Tube station (or bus stop), which would refer you to another manual, where you would find the initial station or stop, which would probably be familiar so there wouldn't be any need to repeat the initial process. What the A to Z did (in conjunction with the technologies of transport) was to render journeys obsolete and make them simply a displacement:

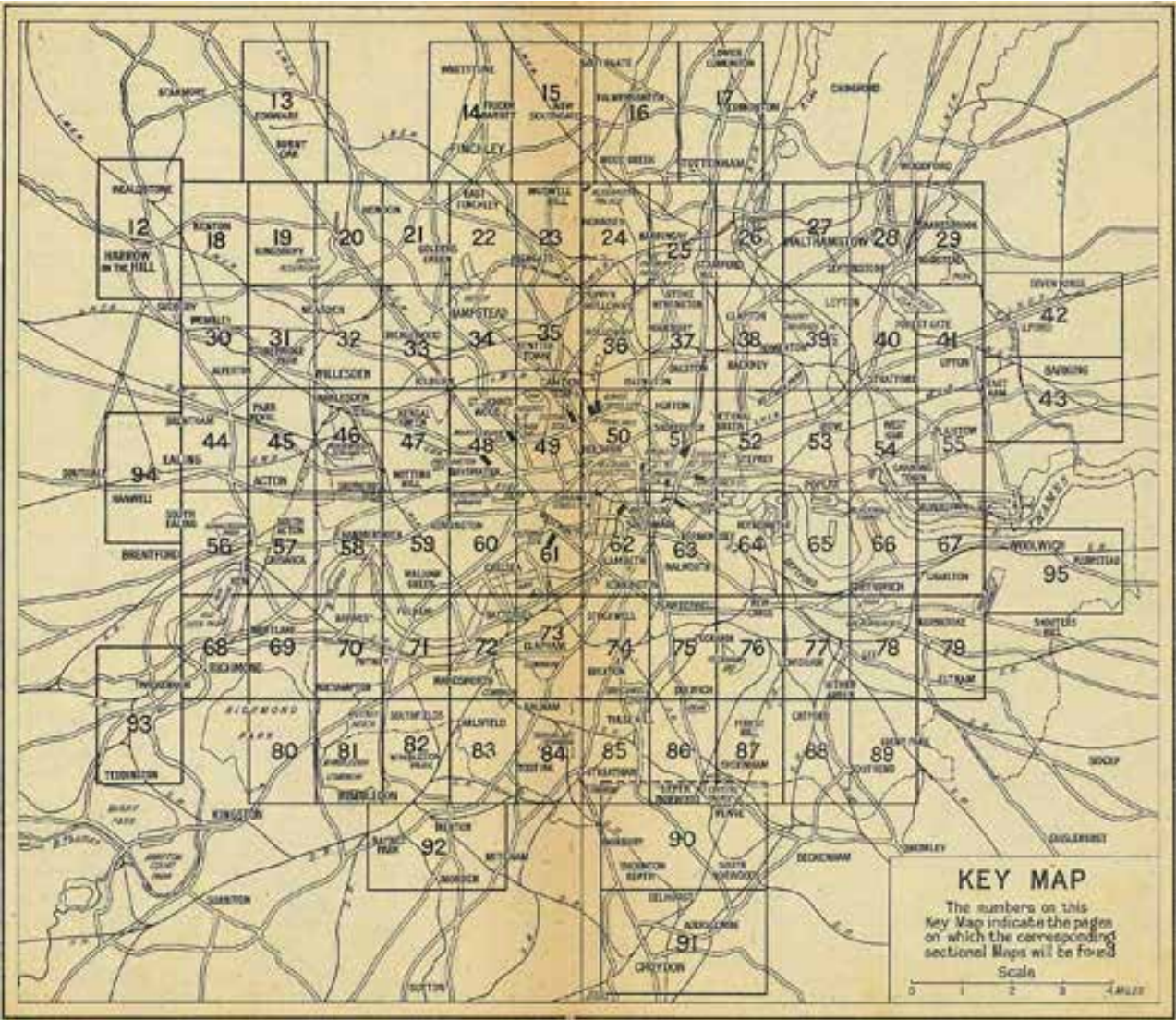
first you were in page 15 and then you were in page 53, and that is all there was to know. The whole of the city was broken down into pages into a worded manual rather than a visual one. The A to Z did contain the whole of London, but dispensed the information in partialities, the metropolis becoming a paginated whole: however much effort the A to Z's authors put in providing a glimpse of next page's maps, the fact is that the user could not, and not needed not, put in her mind the view of the whole.

The city out of mind yet at hand: this had been the case especially from the nineteenth century onwards. The accumulation of people, changes, growth, difference, detail, technologies, inventions, codes, norms, were an overwhelming amount of information to deal with for a stranger and a local. Orientation devices helped: they selected, coded and translated what was there into a handy aid, something that could be put in a pocket and be consulted mid-way. These manuals contained, in their banal, commercial, everyday qualities, the practical knowledge of the city, the key to the maze. They came in different shapes and sizes and, as they responded to the logic of the market, adjusted to the particular demands of their users: genres were thus pushed and the scientific map, often the base for them, became the mere background for other forms of *graphie*s. Synthetic views of the whole; indexes, lists and catalogues; surfaces that ceased to be colours and became textures; measures not of space but of time; narrative descriptions rather than geometric ones – the manuals to the city became modern chorographies. These chorographies, however, were not only passive representations: they also constructed a very specific and pervasive knowledge of the metropolis, even shaping London *itself*.



**1. London A to Z**  
Geographer's A to Z  
Map Company, 1938





2. Key to London  
Geographer's A to Z  
Map Company, 1938





3. Cruchley's New  
Plan of London and its  
Environs (detail),  
George Frederick Cruchley,  
London, 1835, British Library

*Cruchley's New Plan of London and its Environs*<sup>2</sup> (1835) is perhaps the closest to a scientific map. A vast image of London, measuring 142x134cm, it represents the city at a scale of 8 inches to the mile. The map was intended to be carried, perhaps not in a pocket, but certainly to be kept in hand. When folded, it fits inside a 15x20cm cardboard case, the exterior of which displays information about other maps and guides from the same publisher. The map shows London as a mass composed by black-hatched city blocks, surrounded by empty white countryside – the topography of which is represented through pictorial shadowed relief instead of scientific contours. The suburban white zone is the actual limit of the city, generating a figure-ground relation between city and its environs: the white extension intensifies the completeness of London, the possibility of grasping it in one sight. The black-hatched city blocks construct an interior of similarity: all ordinary city blocks are represented in the same way, with only some landmark buildings highlighted by the use of solid black as infill. Due to the scale of the map, the drawing provides a large amount of information: parish limits are highlighted in bright pink, main thoroughfares are painted light pink, street names populate city roads, some buildings carry their names and, in bigger fonts, districts and counties are also singled out and noted by coloured boundaries and names. *Cruchley's New Plan* is a map that contains and condenses a view of the whole of London, together with some useful information, still quite general, in one piece of paper. It imposes a degree of abstraction into the rendering of the city (by making all city blocks similar), but provides means of differentiation, such as street names.

The *Perambulator*<sup>3</sup> (1832) is a different kind of orientation aid: the map comes folded inside an 18x10cm book and complemented with a street finder and a guide, all in one. When unfolded, the map's dimensions are 81x56cm. The *Perambulator's* ambitions are already stated in the title: "Book of Reference & Guide to *every* Street, Square..." Its exhaustiveness pretends to be of use both to residents and strangers. To perfect the experience of the city, the *Perambulator* not only shows every street with its name *on* the map, but the book that precedes it contains a



**4. Unfolded map**  
*Cruchley's New Plan of London and its Environs*  
 George Frederick Cruchley,  
 London, British Library



**5. Map in box, not in pocket**  
*Cruchley's New Plan of London and its Environs*  
 George Frederick Cruchley,  
 London, British Library



list of more than a hundred pages of “streets, squares, lanes, places, etc”, followed by twenty-two pages listing public buildings. The list provides a code for finding where things are, and refers to a circular grid with inscribed numbers in the folded map. This circular grid, with its centre in Saint Paul’s, also serves another purpose: it is a tool for calculating coach fares. As the “Explanation” in the map reads:

*St. Pauls being the centre each circle is successively six furlongs or three quarters of a Mile when measured in a direct line and for estimating Hackney Coach fares &c. it may be considered that after allowing for the Angular turns in the Streets the distance from one circle to the next will seldom exceed a Mile.*

It then teaches the reader how to make use of the orientation device:

*NB. To find any place wanted expeditiously look at the Street list and (for Example) proceeding Fleet St. Temple Bar will be found a figure of Seven which corresponds with the number of division on the Map in which Fleet St. will be found the same rule must be observed with any other place or Public building wanted in the Metropolis.*

The *Perambulator* also records other aspects of the city, together with its general form and structure. The booklet containing the street name list provides “A brief historical and descriptive account of LONDON” starting with London’s position in the world: “The chief city of an Empire, the extent of which is so unlimited that the sun never sets upon its territories...”<sup>4</sup> and describes it from its ancient history, through the middle ages and up to 1830s. It starts up in the air: “To sketch with fidelity a picture of London, as it appears in 1831, is nearly as difficult a task as for artists to delineate the evolution of the Aurora Borealis – the changes of the one are nearly as rapid and as fanciful as those of the other; everything around is the victim of mutation<sup>5</sup>” and then proceeds to enumerate and describe cathedrals, churches, chapels, public schools, benevolent institutions, miscellaneous edifices, bridges, docks, markets, theatres and places of amusement, public exhibitions, literary and scientific institutions, civil government, prisons, recent improvements and, finally,



6. First page,  
*The Perambulator*  
London: J. Pigot & Co.,  
1832, British Library,



7. Detail of map from  
*The Perambulator*  
London: J. Pigot & Co.,  
1832, British Library

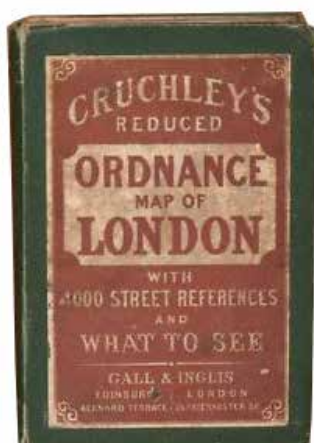
projected erections and improvements – so not only the past and present, but also the future. It also provides information such as the population of the city of London, bankers, descriptions of its environs, regulation of hackney coaches, chariots and cabriolets, fares of watermen and boats, coach routes and steam packet routes.

Resident and stranger therefore have the whole city in their hands and do not even need to look up or walk in it in order to know it. As the Preface points out, only “the slightest attention (...) is requisite to put the stranger in immediate possession of the exact situation of any particular place or building in London”<sup>6</sup> thanks to the list and grid. The *Perambulator* is a

*portable companion, and an unerring and intelligent guide, to those objects in the Metropolis and its environs (...) and they [their makers] leave him [the reader] with a sanguine assurance that, with the PERAMBULATOR in his pocket, he will find himself not more perplexed amidst the busy scenes and intricacies of the ‘Town’ than when traversing the green lanes and verdant meadows which diverge from or surround his ‘Country Home’.*<sup>7</sup>

Most of all a guide for the suburban stranger, everything that is needed to fit in the modern city is contained in the *Perambulator*’s pages. Its novelty is that it is a very precise map supplemented by a wealth of information (historical and practical) together with a tool for street finding – and that it fits in the pocket<sup>8</sup>.

The pocket book format not only was used to contain text-based depictions that complemented maps, such as the one given in the *Perambulator*: it also allowed for experiments, such as the separation of toponymy from topography<sup>9</sup>. *Cruchley’s Reduced Ordnance Map Of London with 4000 street references and what to see*<sup>10</sup> (1868) is an early street finder. Based on the Ordnance Survey skeleton map, the folded map shows London from the docks to Earl’s Court. The city is presented all at once, in the usual abstract way (hatched city blocks, public buildings in solid black), but street names have been taken out. Instead, an orthogonal grid has been imposed displaying capital letters in the horizontal (from C to Q) and small letters in the vertical (from e on top



#### 8. Cover

##### ***Reduced Ordnance Map of London***

George Frederick Cruchley,  
London, 1868, British Library





9. Detail from map in  
Reduced Ordnance  
Map of London  
George Frederick Cruchley,  
London, 1868, British Library

10. Detail from map in  
*Cross Pocket Plan of London  
and Street Directory*  
Joseph Cross, London,  
1847, British Library

to o on the bottom). Here, the letters do not name the line but the space defined by the lines: Saint Paul's appears in the intersection of the lines separating bands M and N on the vertical and bands l and k on the horizontal. An appendix lists, allegedly, 4000 streets referring back to the grid, plus some very brief descriptions of "entertainment, public buildings, &c. to accompany *Cruchley's New Map of London* with descriptions".

In the same vein as the *New Map*, the 1847 *Cross' Pocket Plan Of London And Street Directory*<sup>11</sup> is a very discreet book, with gilded sides and measuring 10x15.5 cm – a true pocket size street finder. In here, the street list is presented at the beginning of the book and the folded map follows. The book starts by saying how

*Any Street or Square in the Map may be readily found by attention to the alphabetical arrangement of the Names, and reference to the Square on the Plan, as A1, or A2, &c. The letters of reference are at the top of the Map, and the figures on the side.*

After fifty-two pages listing streets, the *Pocket Plan* lists some attractions (Public Exhibitions) and gives information relating to new hackney coach fares and railways, plus other publications made by Cross: London, Van Diemen's Land [Tasmania], and some more "Colonial Publications": Australia, Tasmania, Canada and the United States. The map that follows is not printed on paper, but on thin cardboard and is richly coloured. It measures 44x75cm when unfolded, is synthetic in its information (usual city block hatch, green parks, blue waterways, coloured district boundaries, railways and main roads) and displays an orthogonal grid that provides the scale: "[t]he smaller figures on the margin of the Plan are the measurements in half miles from the two lines that intersect Saint Paul's Cathedral at right angles, the whole surface being divided into half-mile squares". *Cross' Pocket Plan* does not indulge in lavishly describing the attractions of London, but instead is quite direct and succinct in pointing out some practical information; at the same time, it is not a mere street finder, because it still includes some extra information.

The format dictated by the pocket imposed a number of constraints to the way in which London could be captured and relayed to the stranger. From



**11. London as list**  
First page, *Cross Pocket Plan of London and Street Directory*  
Joseph Cross, 1847,  
British Library

**12. Cover**  
*Cross Pocket Plan of London and Street Directory*  
Joseph Cross, London,  
1847, British Library



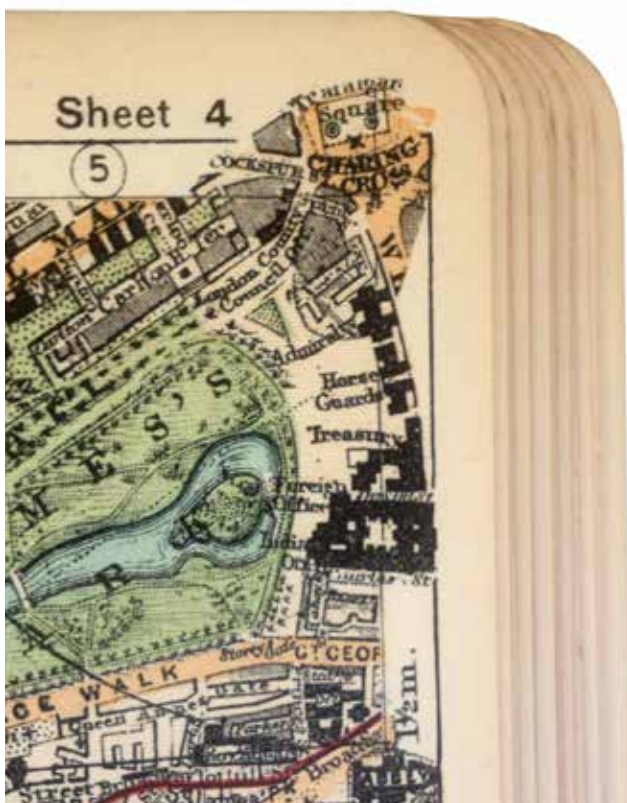
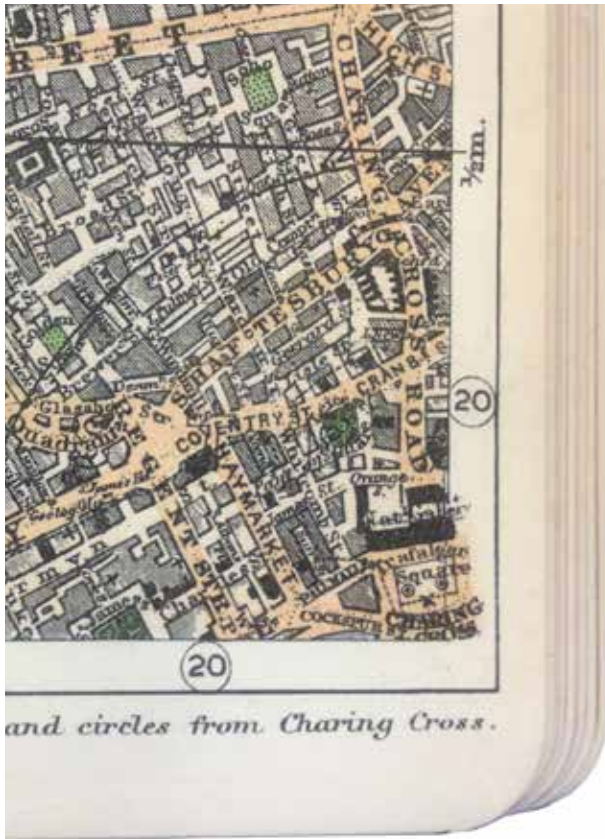
*The Metropolitan and City Police Districts extend far into the environs of London and embrace an area of 690 square miles. The total length of Streets and Roads patrolled by the Police is 6,796. The increase in the length of Streets during the past ten years has been 485 miles.*

The solution for Bacon is pragmatic and graphic: “The area represented in this Atlas measures 15 miles from North to South, and the same from East to West, making 225 square miles”. Rather than accommodating his drawing to the demands of the polysemic kaleidoscope that was London, *Bacon’s Atlas of London and Suburbs* draws a square over the city. This square-angled London is then geometrically partitioned,



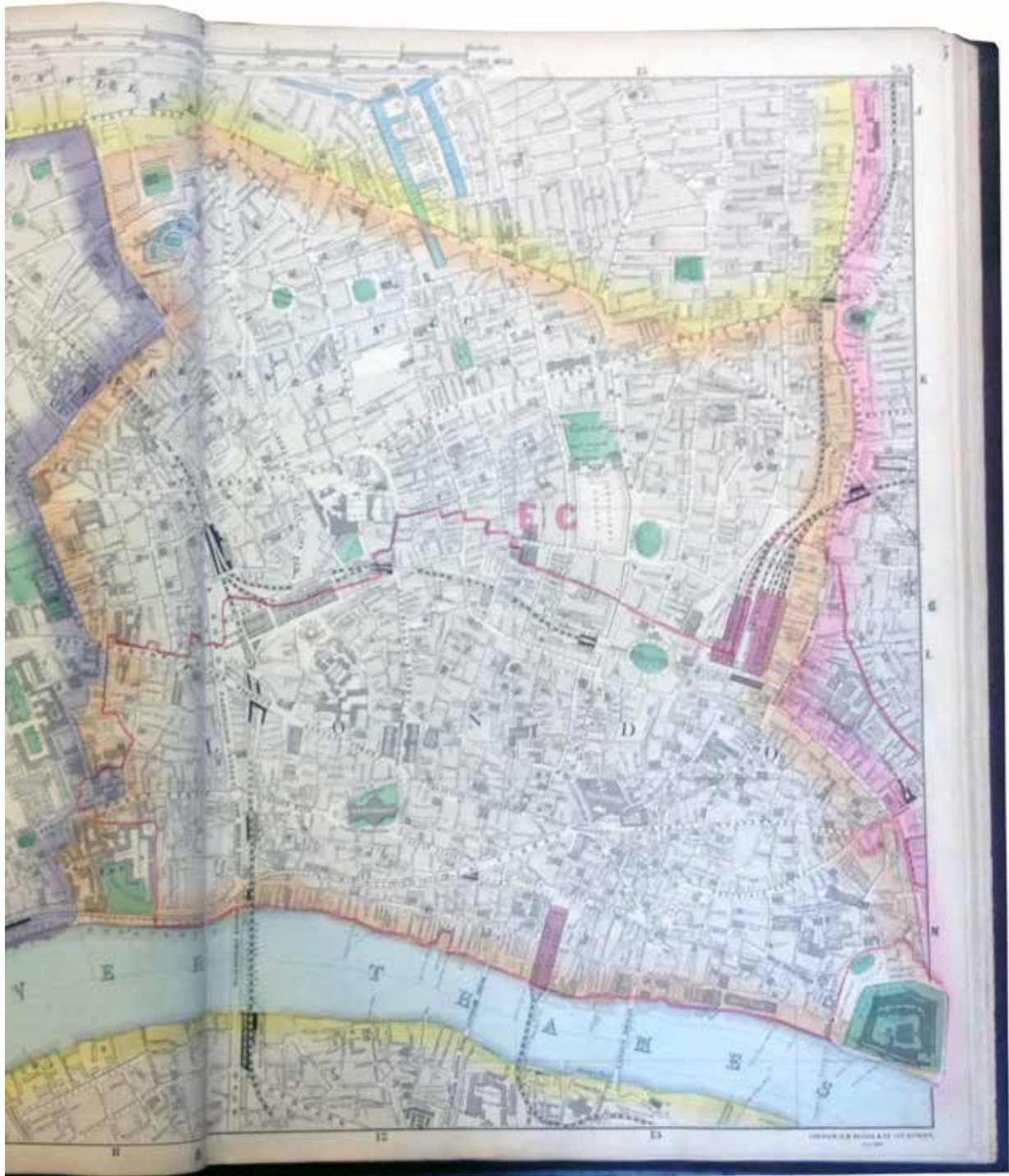
**14. Snail London**  
Page with key to  
atlas, *Bacon's Pocket  
Atlas of London*  
George Washington Bacon,  
1894. British Library



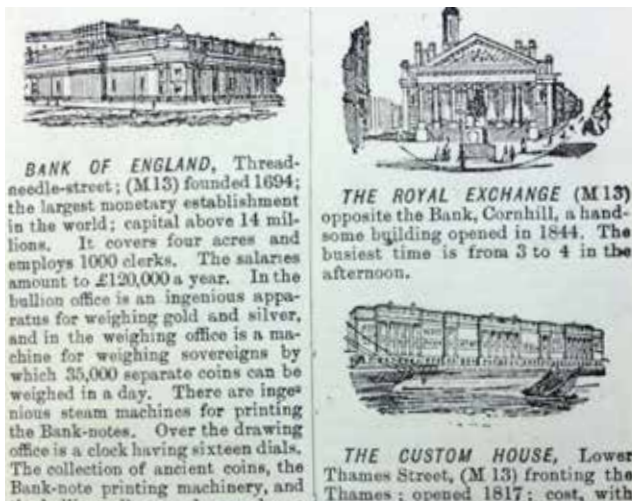
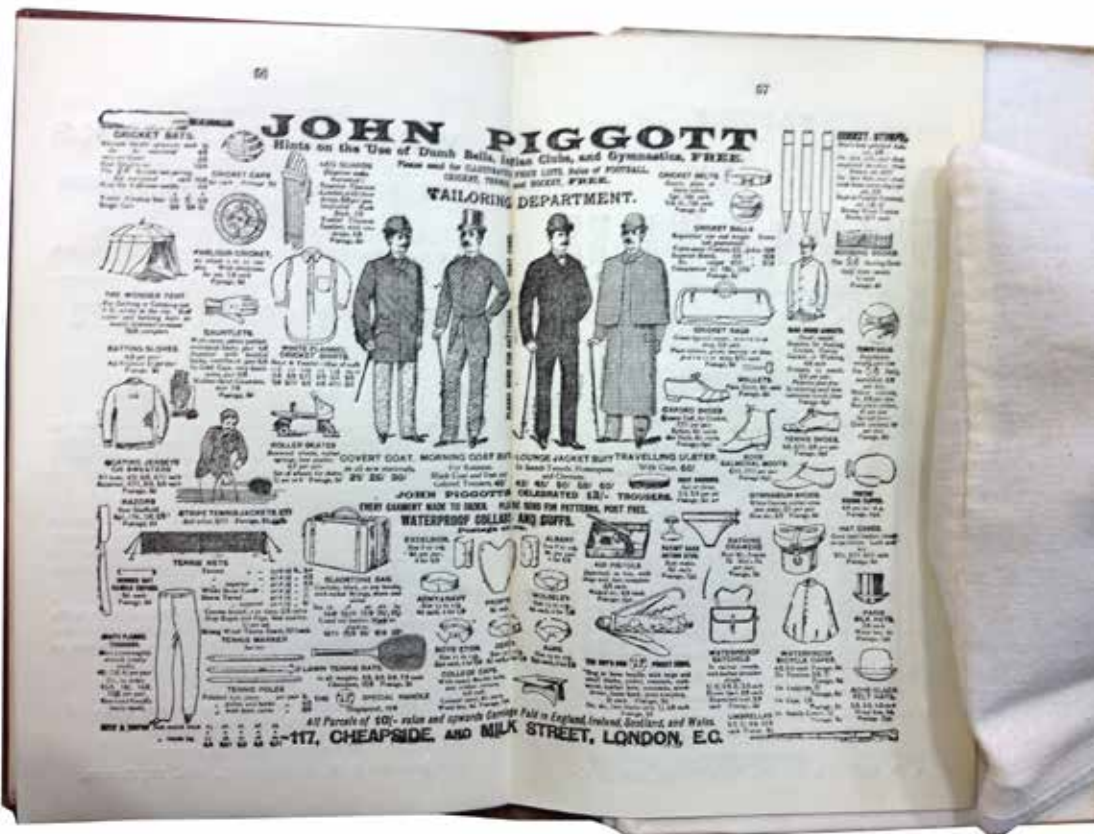


15. Where is Trafalgar Square?  
 Bacon's Pocket Atlas of  
 London, George Washington  
 Bacon, 1894, British Library





16. *Bacon's New Ordnance Survey Atlas of London and Suburbs*  
George Washington Bacon,  
London: G. W. Bacon,  
1879, British Library



17. (top) How to dress  
Bacon's New Map of London  
Divided into Half Mile Squares  
& Circles (first pages),  
George Washington Bacon,  
London, 1890, British Library

18. What to see  
Bacon's New Map of London  
(detail of guide), George  
Washington Bacon, London,  
1890, British Library

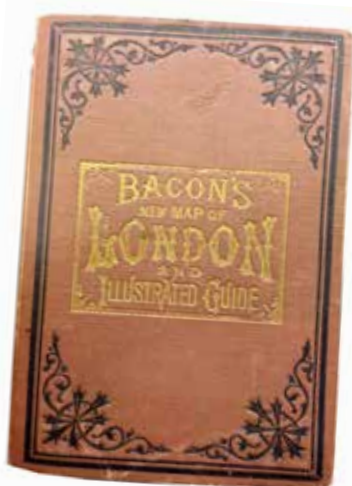
19. Where to go  
Bacon's New Map of London  
(detail of map), George  
Washington Bacon, London,  
1890, British Library



and each section is turned into an individual map, which is then collated with the others to compose the atlas. Like the grid, pagination introduces an external device that allows dealing with part and whole, detail and size. This search for clarity sometimes produces more confusion: *Bacon's Pocket Atlas of London* from 1894<sup>13</sup> impose Paris-like snail quadrants that start at Saint Paul's to paginate the whole, resulting in a completely illegible and disorienting distribution of maps; it also locates Saint Paul's at the intersection of the grid, effectively leaving the centre out of sight.

Atlas, street finder and folded map are all versions of the same strategy: adapting the map to the format of the book, sometimes only by using drawing, others by bringing in external aids, but remaining within the cartographic genre. The book also supported another kind of orientation aid to London: commercial guides depart from the cartographic and dwell almost exclusively on the reproduction of city form. Guides such as *Bacon's New Map of London and Illustrated Guide*<sup>14</sup> (1890), apart from a small map and a street name list, centre on advertisements, reproducing the texture of the city. In *Bacon's New Map*, ads have a very prominent role: right after the book cover, you find an ad for "Chas. Baker & Co.'s STORES, LIMITED GENTLEMEN SUPERIOR CLOTHING." This is followed by a small map that shows London in a large scale, more ads, a "Strangers' guide to London" listing Public Conveyances, the Metropolitan and District Railways (mostly underground), the North, East, South, City and South London Electric Railway, Tramways, Omnibuses, Steamers above and below London Bridge and a special section on cab regulations. The guide also prescribes how to interact with cab drivers and is central for the good functioning of this system:

*To prevent disputes, before calling a cab, ascertain the exact fare, by reference to the list or by the map, which is divided into half-mile circles and squares, and when the journey is completed, hand the exact amount to the cabman. Strangers are also advised, before entering a cab, to demand a ticket to the driver which he is legally bound to give and which will be useful in case of dispute.*



20. Cover,  
*Bacon's New Map of London*,  
George Washington Bacon,  
London, 1890, British Library

It then suggests and describes places of interest in London, with a sketch, their addresses and location (by way of a grid), plus a short description, which ranges from the detailed to the succinct:

*BANK OF ENGLAND, Threadneedle-street; (M13) founded 1649; the largest monetary establishment in the world; capital above 14 millions. It covers four acres and employs 1000 clerks. The salaries amount to £120,000 a year. In the bullion office is an ingenious apparatus for weighing gold and silver, and in the weighing office is a machine for weighing sovereigns by which 35,000 separate coins can be weighed a day. There are ingenious steam machines for printing the Bank-notes. Over the drawing office is a clock having sixteen dials. The collection of ancient coins, the Bank-note printing machinery, and the bullion cellars can be seen by an order, for which to write to the Sec. Orders can be procured through the manager of any London bank for a customer of any such bank and his friends. The public may walk through the offices between 9 and 4.*

(...)

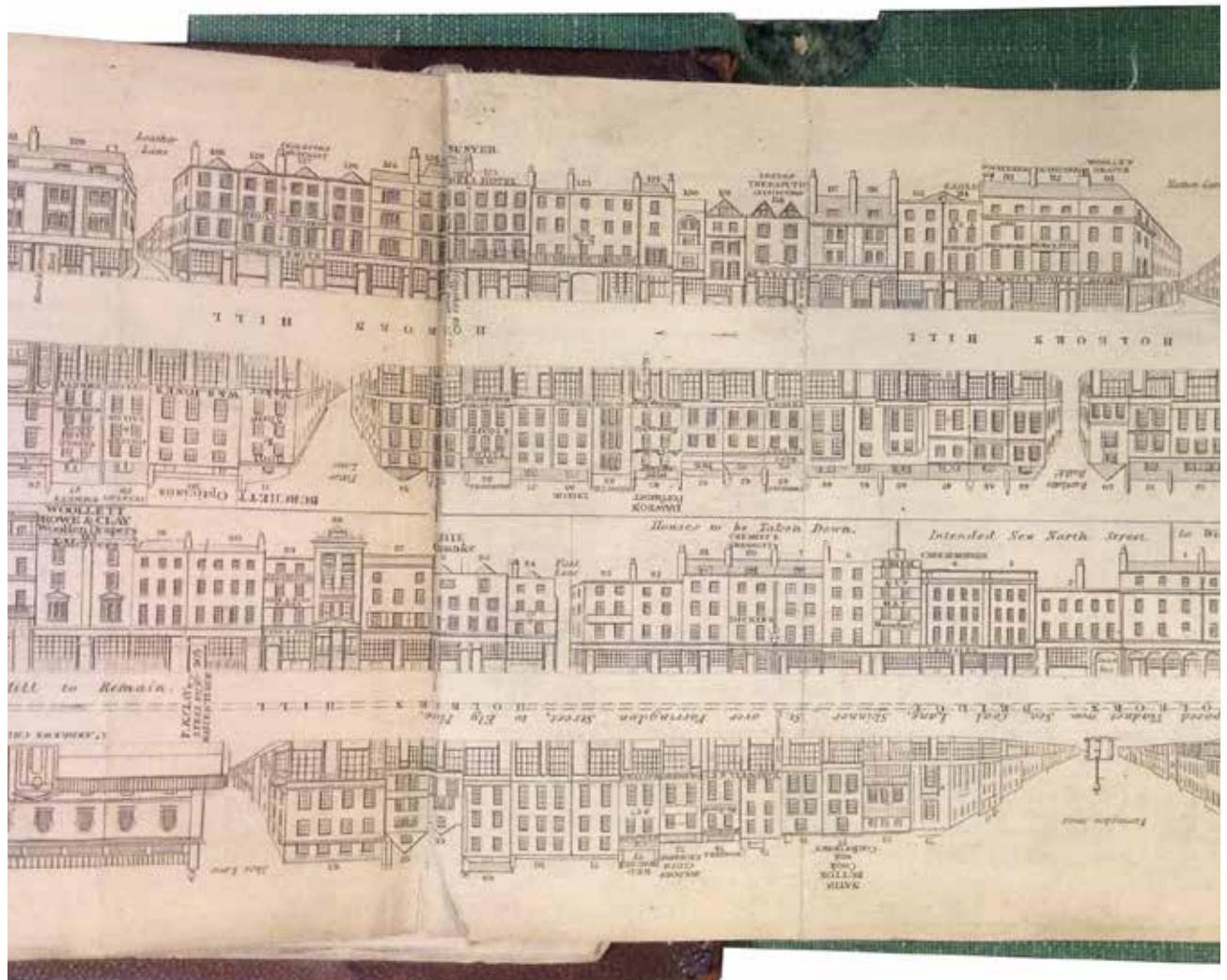
*THE ROYAL EXCHANGE (M13) opposite the Bank, Cornhill, a handsome building opened in 1844. The busiest time is from 3 to 4 in the afternoon.*

The map in *Bacon's New Map* is secondary to the display of other information: apart from the street list and the guide to museums, picture galleries, palaces, bridges, hospitals, markets, parks, principal churches, principal chapels, principal catholic churches, places of amusements, theatres, music halls and places of interest near London, it includes a "Strangers' Guide To Shopping And Travellers' Requisites" reassuring the public that "The Firms mentioned in the following List are old established, well known, easily accessible, and can be recommended to strangers." The synthetic map thus comes last within the rest of the textual information.

*Tallis' London Street View*<sup>15</sup> (1839) is perhaps the most inventive in terms of reproducing the texture of the city. In what is an innovative layout, *Tallis' Street View* describes the city by the aggregation of different types of information: on the page to the left, a long strip of paper measuring 44x14cm, folded in half, shows a street elevation, the main road in the centre, and building façades to each side,



**21. Wayfinding device**  
*Tallis's London Street Views*  
John Tallis, 1839,  
British Library



22. Street views  
Tallis's London Street Views,  
London, 1839, British Library



orthogonally drawn<sup>16</sup>. This page also shows a plan of the area described, together with a perspectival drawing of the main attractions – a statue, an obelisk, a palace. On the page to the right, measuring 24x14cm, *Tallis* displays text-based descriptions: the page has been divided in three, with the central part dedicated to historical and morphological descriptions, and the two sides flanking these descriptions, to advertisements. These refer back to the street views: “See 145, in the Engraving”, “The shop of Mr. Chamberlain, Optician, No. 37 Broad-Street, near Middle-row, (as represented in our Vignette)”. The ads are mainly for men, but some appeal to women: we find references to guns, shaving, tobacco, hats, perfumes, clothes, drugs, warehouse objects, ironmongers, pills, powders and syrups, machines, spectacles, looking glasses, floor clothes and carpets, food, powders and clothes for infants and invalids, medicines, drapers, hosiers and mercers, musical instruments, printing and publishing, stationary, upholstery, furniture, liquor, snuff, pipes and hotels.

*Bacon's* and *Tallis's* coopt the language of advertisement and introduce it almost without mediation to the city guides, although not quite in the same way: *Bacon's* mainly reproduces the graphics, whereas *Tallis's* adopts the syntax present in the city. The operation in place is not just a reproduction, but one that *organises* the information into a legible way. The guides eased access to the deluge of information in London, fits it into a normalised format, size, font type and layout, offer a way to understanding it (by locating it and/or vouching for it) and, therefore, prescribe a way to read the three-dimensional city.

From *Crouchley's New Plan* to *Tallis's London Street View*, all these manuals try to present the whole of London in one sight, either by simplifying it and showing it in one page or by condensing all possible detail into handy pages. They use different forms of abstraction: from more traditional map-making conventions to inventive systems of representations, they all ultimately select, code and translate what is there onto paper. They relate to walking in different ways: with the map, the city walker can actually trace his or her route with the finger over the drawing before going out – a scaled-down version of both city and event. Street finders offer a coded tool for locating the two most relevant points in a walk (the here and the there), with a peak in the *A to Z*, where the in-between is virtually inexistent because it has been broken down into pages and therefore does not contain the continuity of the city. Commercial guides try to include some aspects of the in-between but do so through a text-based and edited accumulation rather than by capturing a sequence. Movement, the central aspect of a walk, is therefore inexistent in these representations: it is rather the capture of the city as a whole, its structure or the surface's syntax, but never the reproduction of a walk itself.

Yet it is not that capturing a sequence is impossible for an orientation device, it just happens that sequences are evicted from the urban. Maps, street finders and commercial guides provide a representation of a similar interior, by showing what is there, either as a simplified whole or as detailed complexity, *all at once*. They get

rid of the sequence and instead reproduce points, either all together on one sheet or spread across pages: essentially, there is no narrative joining the dots. In contrast, narrative, as way of capturing a sequence, can be found describing the exterior of the city. When evicted from the urban, movement, time, narrative, go to the suburban. A rather wonderful case is the 1886 *Rustic Walking Routes* series<sup>17</sup>. These guides are a set of four books, each concerning a quadrant around London, proposing more than thirty routes per guide, from suburban train station to train station, with the possibility of being linked. They combine two kinds of representation of a walk, both capturing its sequence. Walks are described with words and with a drawing; when in words, the walk is described as a matter-of-fact set of instructions:

*From the station go out through the booking office, straight across the road to a flight of steps, and through the wicket gate at the top; turn to the left and follow the broad path through the fruit garden, and go on by the continuing road to St. Pauls Cray Common and across it to Chislehurst. Where the road divides at the beginning of the houses, bear to the left; and at the church keep straight on past the Tiger's Head, nearly half a mile across Chislehurst Common to a finger-post at the cross roads, then still straight on (Bromley) for 160 yards to a swing gate on the right, opposite the first house on the left<sup>18</sup>.*

In order for it to work, the description needs the reader to be in place: in no other way instructions such as “turn to the left” or “opposite the first house to the left” can work. In the same way, the descriptions can be continuously edited through time – why can’t the fruit garden change into something else that prevents passage?

When described through drawing, the walk is represented through the use of strip maps, a genre with pre-scientific origins. The strip map focuses in representing the line the walk draws over the territory, rather than in the reproduction of the extended landscape where the walk happens. The disposition of the strip map is not dictated by geographical conventions, but made to fit the space of the page, and the elements



**23. How to walk in the suburbs**  
Details from *Rustic Walking Routes within the Twelve-Mile Radius from Charing Cross*, W. R. Evans, London, 1890-1886, British Library

## 6.—EPSOM TO HAMPTON.

(About 9 miles.)

**Outset.**—To Epsom by S. W. R. : 3 cl. from Waterloo, 1s. 2d. Or by Brighton line : 3 cl. from London Bridge or Victoria, 1s. 2d.

**Return.**—From the Brighton station turn to the right a quarter of a mile to the cross-roads at the Spread Eagle, then to the right and under the railway. From the S. W. station go leftward down the approach, and then turn to the left under the railway.

Go straight on by a foot-path to a road, cross over to a stile on the right of the approach to Epsom Court farm, and at the fork in the first field take the left path three-quarters of a mile to Horley, taking the middle of the three paths in the last field. Cross the road rightward to a stile and follow the path one mile to Chesham Church, conspicuously in sight in front. At the church turn to the right 40 yards, to a stile opposite, and take a foot-path to a road at Hook, where turn to the right 170 yards, then to the left to Claygate half a mile to cross-roads. Take the opposite road (marked foot-path to Thames Ditton) to Walrus Farm, where go straight up the farm-yard, and at the top turn to the right along a foot-path two-thirds of a mile ; at its end take a continuing road under three railways, then turn to the left under a railway and about 100 yards beyond, to an open common, where turn at once to the right, well away from the road, into a foot-path ending in a private road ; turn to the left to a green, and bear rightward along its right edge, crossing a high road and passing to the right of a large pond, to a stile in a corner, where take a foot-path across to a road, turn to the left into another road, then to the right 300 yards to a lane on the left. Go down to the end of this, then at the left corner find an alley-path, cross the river Embur and turn rightward along its bank ; cross the river Mole by a foot-bridge, go up the lane and the opposite road (Spenser Road), and at the corner of Beaconsamp Road on the left take a much-used track across building land, with a threatening notice about trespassers. At its end turn rightward to the Walton Road, then to the left ; at the Europa Inn turn to the right up Dennis Road, bearing to the left along Hurst Lane to the end. Turn to the left 250 yards and then slant rightward across Hampton Race-course to the ferry opposite the Church. Cross the Thames, go up to the street, and turn to the left, then to the right (to Richmond), and immediately again to the left along New Street half a mile to the station, which is down the last turning on the left before the road goes over the railway bridge.

**Return.**—By S. W. R. : 3 cl. to Waterloo, 1s. 2d.



## 7.—RAYNES PARK TO OXSHOTT.

(About 10 miles.)

**Outset.**—To Raynes Park by S. W. R. : 3 cl. from Waterloo, 8d.

**Return.**—On leaving the station by any of the three exits, turn to the right three-eighths of a mile, to a stile on the right just before some new houses, where take a path a quarter of a mile, till you cross a railway on the level into a road. Here turn to the left 60 yards, to a stile on the right, where take a field-path and continuing lane three-quarters of a mile to New Maiden (where Maiden station lies a quarter of a mile to your right). Here turn to the left 200 yards, then to the right 500 yards, to an old barn on the left, where turn down a farm road (third turning on left) and continuing green lane, cross the Hoggsnail river, bear to the right and go up a long narrow field to a wicket-gate at the end, then bear to the right along the hedge to a lane with a finger-post (bridle-path to Maiden), follow this bridle-path to a farm, where turn to the right, then the first on the left, to the end, and turn to the left down King Charles Road and the continuing green lane and common ; at the end of the common cross the stile and turn to the right and out by a gate into a road. Slant rightward to the opposite road on the right of the inn and go half a mile down it to a stile on the left marked "foot-path to Hook," which follow straight on a quarter of a mile to a cottage, where turn square to the right across fields half a mile to a road ; turn to the right, bear to the left at the fork, until you come out on the high road at Hook. Here turn to the left 100 yards, then to the right 400 yards, where (50 yards beyond the Cricketers Inn) you will find on your left a finger-post (bridle-path to Claygate), and facing you a stile with a finger-post (foot-path to Claygate). The latter takes you half a mile to a road where turn to the left (left again at the fork) a long half mile to Claygate Common ; the former goes straight for over half a mile, through a green lane, alley-path, and along the left edge of three fields, then in the fourth field turns to the right, through a small gate into a wood and on to a house on the left ; 50 yards beyond this the bridle-path bears to the right, but the foot-path slants to the left into a road, where turn to the left a quarter of a mile to Claygate Common.

Here the road turns off to the right ; but keep straight on along the left edge of the Common, and through a short green lane to a road, where turn to the left half a mile, through Barwell Court Wood (sometimes very muddy) ; at the second turning on the right, where a fence crosses the road, turn to the right one mile to a high bridge over the railway, which cross for Oxshott station (up side) ; for Oxshott village turn to the left one mile on first reaching the bridge.

**Return.**—By S. W. R. : 3 cl. to Waterloo, 1s. 5d.



represented are the ones described in the accompanying text. In summary, the walks are captured and prescribed through the sequential description of a sum of landmarks, bypassing conventions for representing space and time by the hybridisation of writing and drawing into a set of instructions and a strip map. It is telling, however, how this technique is evicted to the outskirts of the city: they offer an escape from the dense and complex urban experience through this gateway to the countryside. These guides colonise the rural by way of solitary gentlemen walking with their canes and laconic guides in their pockets, in explicit contrast to the commercial and condensed urban experience the other maps and guides describe and prescribe – if the commercial maps and guides provide for pleasure, the *Rustic Walking Routes* does so for leisure.

In whatever way they work, maps, street finders and commercial guides are in the end all performing the same operation over London: they capture it as a whole and put it at the disposition of the metropolitan subject. Whether they step away to have a better view, classify every metropolitan aspect or painstakingly try to capture every detail, they are all controlling both the city and the possible movements that can take place in it. The metropolis is presented as a complete, limited, entity, its boundaries carefully drawn either by managerial lines (as the penny-post limit) or by the surrounding suburbs (clearly demarcated as non-metropolitan). Rather than being represented through painterly renditions of its material surfaces, as Renaissance chorographies would have done, these modern chorographies convey the whole of the city either through simplification, where everything similar is represented in the same way, or normalisation, where text-based grammar and orthography are imposed over a grammarless city. For them to be useful, some further operations are performed: the imposition of abstract external aids, such as grids and indexes, the eradication of sequence in favour of independent fragments and the breaking down of the image into paginated compendia. The point of view is either the stepping away of the mapmaker, from territory to geometry and from then to the abstraction of the diagram, or the stepping back of the editor, with the immersed viewpoint of the narrator/reader relegated to solitary walks amid the non-urban.

Knowledge of the city is relocated from vision to reading: direct experience is no longer the only source of knowledge. What can be derived from a single walk would never attain the same degree of precision and accuracy offered by these manuals. They put forward a kind of knowledge that strives to the absolute, as it replaces partial, relational, situated knowledge with its total view of the whole. The knowledge of the modern city that the informed pedestrian holds is now rooted in the precision of science; it becomes timeless, for it relies not solely on experience but also, and perhaps more confidently, on the arrested moment captured by the manual; totalitarian, as it looks for the whole and makes detail secondary; structural, for it wishes to identify it under the complexity of the city; and radically orthogonal, as orthogonal as the

right angles of the page, be it quad royal, A1, leaflet or book. It therefore starts to complement (and slowly replace) the relational, partial, sequenced, superficial and, by definition, perspectival knowledge associated with the direct experience of the city.

These were only hand-made attempts at having knowledge of both whole and part at the same time, personal enterprises trying to reach the point of view of the gods, the muses or the Pythia. In the twentieth century, the combination of two machines allowed the conquest of the view from above. If until then maps had offered a fictional, composite view, and hot-air balloons and other precarious means had opened up the skies to only a few aeronauts, in the twentieth century the aeroplane made it accessible to anyone. Coupled with it, the photographic camera, perfected and popularised in the early twentieth century, was able to register the surface of the earth with unseen precision, revealing the whole truth about the city and the land below<sup>19</sup>. The truthfulness of the photographic view from above, rooted in military and archaeological work, with both a strategic and a scientific origin, quickly made it the basis for planning. The aeroplane's view from above was the one that allowed for a synthetic vision of the city's social space, the one that offered the required distance for a potential manipulation through planning – hence its almost immediate adoption after the war<sup>20</sup>. Photography, on the other hand, permitted a focus on change and not only on permanence. It turned out that, after all the pressure that the technologies of transport had placed on space and time, it was reasonable that the solution to the problem of how to capture both whole and detail was technological. The authority of the photographic view from above thus replaced graphic experimentation: the Ordnance Survey started deriving its maps from aerial shots, and the subsisting manuals accommodated to this new setting as well. The aerial view ended speculation and installed certainty: the view it showed was that of the whole *now*. Nothing could be truer than that.



- 1 See Phyllis Pearsall, *A - Z Maps: The Personal Story from Bedsitter to Household Name* (Sevenoaks: Geographers' A-Z Map Co, 1990).
- 2 George Frederick Cruchley, "Cruchley's New Plan of London and Its Environs" (London: Cruchley, 1835). British Library, Maps 60.b.7. Full name as stated in the cover: CRUCHLEY'S New Plan of London and its Environs, extending 6 Miles round St. Paul's, on a scale of near six inches to a mile; including Plans of the Villages of Highgate, Hampstead, Hammersmith, Wandsworth, Greenwich, Lewisham, Lee Green, &c.; mounted in a case, with the *Parish Boundaries coloured*, the only map of the kind ever published, 45s.
- 3 Unknown author, "The Perambulator; Or, Book of Reference & Guide to Every Street, Square, Court, Passage & Public Building in the Cities of London and Westminster, the Borough of Southwark and Their Respective Suburbs. Together with the Most Extensive List of Mail & Post Coaches Hitherto Published ... Accompanied with a New Plan of London, Etc." (J. Pigot & Co., 1832). British Library, 010347.cc.8.
- 4 Ibid.
- 5 Ibid.
- 6 Ibid. Preface
- 7 Ibid.
- 8 It prefigures the paperback by a few years: Routledge & Sons was founded in 1836 and Ward & Lock in 1854, both publishers of paperbacks sold in WH Smiths and especially directed to railway travellers.
- 9 Although the streetfinder as genre dates back to 1623 according to Barber. He refers to a map that lists streets at the bottom – so still showing London in one sight. Peter Barber et al., *London: A History in Maps* (London: The London Topographical Society in association with the British Library, 2012), 329.
- 10 George Frederick Cruchley, "Reduced Ordnance Map of London." (Edinburgh, London: Gall & Inglis, 1868). Full title as quoted above. British Library, Cartographic Items Maps 213.a.25.
- 11 Joseph Cross, "Cross Pocket Plan of London and Street Directory." (Joseph Cross, 1847). British Library Cartographic Items Maps 202.a.54.
- 12 George Washington Bacon, "Bacon's New Ordnance Survey Atlas of London and Suburbs in Eighteen Double Sheets, on the Scale of Nine Inches to a Mile, with Extensions on the 4-Inch Scale, and Three Supplementary Maps. With Alphabetical Index to Districts, Parishes, Streets, Railway Stations, Public Buildings, Etc." (London: G. W. Bacon, 1879). British Library, Cartographic Items Maps 2.d.30.
- 13 George Washington Bacon, "Bacon's Pocket Atlas of London. (The Up to Date Pocket Atlas and Guide to London)." (London: G. W. Bacon, 1894). British Library, Maps 3.a.66.
- 14 George Washington Bacon, "Bacon's New Map of London Divided into Half Mile Squares & Circles." (London, 1890). British Library, Cartographic Items Maps 202.a.46. Title in cover as stated above.
- 15 John Tallis, "Tallis's London Street Views, Exhibiting Upwards of One Hundred Buildings in Each Number ... the Whole Forming a Complete Stranger's Guide through London ... to Which Is Added an Index Map of the Streets, Etc. (guide)" (London: John Tallis, 1839). British Library, Cartographic Items Maps C.7.a.34.
- 16 The guide has been partly digitised and georeferenced by the Museum of London. It can be accessed here: <http://crowd.museumoflondon.org.uk/lsv1840/>
- 17 W. R. Evans, "Rustic Walking Routes within the Twelve-Mile Radius from Charing Cross. (guide)" (G. Philip & Son, 1890 1886). British Library, General Reference Collection 10349.bbb.32.
- 18 Ibid., 13.
- 19 Anthony Vidler, *The Scenes of the Street and Other Essays* (New York: Monacelli Press, 2011), 320.
- 20 Ibid., 324.



## The view from within

### View

Aerial photography provided a realist view of the whole, but it didn't – it couldn't – make sense of movement beneath. It would always arrest time: it was embedded in its own logic<sup>1</sup>. Its excess of realism also made it non-functional on its own: in order to become a working image, aerial views needed to be stripped of their pictorial qualities and abstracted into line drawings. At the same time, when down on the surface of the city, photography lost the temporary sense of detachment provided by the aeroplane, immediately recovering its corporeality; it was therefore bound to reproduce the point of view of the photographer<sup>2</sup> – after all, it was based on the same theory of vision behind perspective<sup>3</sup>. So photography also struggled with the issues that had troubled modern chorographies: the view from above does grant knowledge of the whole, yet loses ability to capture detail, while focusing on detail means losing grasp of the whole. Movement of people, on the other hand, can only be described (and prescribed) by arresting it – and, generally, by conflating movement with the channel where it happens. The view from above was therefore not enough. The view of what moved over, on, under and in the city and territory was also getting nowhere. The cartographic and pictorial, the realist and the diagrammatic were still insufficient.

Until the perfect orientation device was finally invented for the inhabitants of this island: one that describes the whole of the territory by capturing every single building in Britain, one that, in conjunction with other technologies of the twenty-first century, has replaced every other form of orientation. An apparatus that, because of its nature, does not attempt to replicate a view from above but, instead, offers the view from within, by uncovering its own creation: the structure of life. The postcode, a method of mail management, is today both a description of addresses and a prescription of movement, achieving with its machine-like language what modern chorographies couldn't. Devised as a system for moving things, now it also moves people; designed as a code for identifying the part, it now covers the whole of the country. Its construction – for it was *built* – speaks not of abstraction as a graphic operation over paper, but of a historical one over practices, embodying in its immateriality the course of History.

## Book

At the beginning, there were several books, one in each post office in the country. Their numbers increased at the same rate that offices multiplied, for this was the nineteenth century and railway development made the Post Office expand. This expansion started with Rowland Hill's 1839 reforms, which made posting a letter or parcel something of the everyday<sup>4</sup>. As soon as 1838 the Post Office counted with specially fitted mail carriages appended to trains ("Travelling Post Offices"), in which letters and parcels could be sorted as they went to their immediate destinations. Following the opening up of the territory, post offices and sub-offices multiplied tenfold by the mid-1800s<sup>5</sup>. Together with this outward reaching growth, the Post Office also advanced in the other direction: new urban furniture had to be invented – the first pillar-boxes appeared in London on the 11 April 1855, and doors, even of private households, quickly got a letterbox installed. In 1897 the Jubilee concession secured delivery to every house<sup>6</sup>.

The nineteenth century Post Office might seem a complex, multi-scalar, synchronised-to-the-minute institution, but it was an archaic non-system. It might have worked as clockwork, but it was a decidedly manual one. For this manual non-system, books were the only aid, coming in the form of lists, lists of all the places where letters could go. Various called 'List of Divisions', 'Books of Circulation', 'Circulation List', etc., they were the first attempt at capturing the whole, of giving sense to a non-system that had relied upon single routes opened and maintained by stagecoaches since the seventeenth century. Their purpose was to enable the sorting of letters at every stage of its circulation: from outward primary sorting, to 'roads' (i.e. combination of railways), to inward sorting, to finally the postmen's walks<sup>7</sup>. The England Circulation Book (1871)<sup>8</sup> belongs to the first kind: in 455 pages, it lists nineteen places per page, giving a grand total of 8,633 possible destinations. Imagine a Post Office sorter receiving an envelope addressed to a place called Ash. Before the existence of this book, he would have faced a problem: Ash... where? This book provides the answer: there are only four localities called Ash, two in Kent, one in Salop, one in Surrey, each having a different Head Office. Then the book provides the answer to a more difficult question: as the Post Office's mandate for efficiency got more strict, circulation couldn't be stopped, and so the book also provides the instruction for the next step in the letter's journey by mentioning the 'road' it had to follow in order to circulate, both for Day Mail and for Night Mail. In 1871 a sorter would then have had to make the call of which Ash the sender is addressing the letter to, hoping that the information written on the envelope is enough for him to make the call. More books and lists would again punctuate the following stations in the letter or parcel's journey, ending with those that organised the postmen's walks<sup>9</sup>. This was a time when the Post Office sought to

PLACE	COUNTY	HEAD OFFICE	CIRCULATION	
			Day Mail	Night Mail
Arrad Foot	Lancashire	Croston	Farnham	...
Arretton	Isle of Wight	Swanton	Swanton	...
Arrington	Cambridgeshire	Raynes	Raynes	...
Arundel	Sussex	P.T.	Bag	...
Arvan's St.	Monmouth	Chapton	London & Bristol T.F.O. 2nd Div.	...
Asaph, St., R.S.O.	Denbigh	Wyl	London and Belfast R.F.O., S.W. Div.	...
Ascot	Berkshire	Marston	Marston	...
Ascott-under-Wychwood	Oxford	Easton	Easton	...
Ash	Hants	Southwick	Southwick	...
Ash	Essex	South Ockley	South Ockley	...
Ash	Salisbury	Whitchurch	Caen	...
Ash	Surrey	Farnham Station	Farnham Station	...
Ash	Dorset	P.T.	Portsmouth	...
Ashbourne	Derbyshire	Wellington	London & Bristol T.F.O. 2nd Div.	...

[ 2 ]

## Fitzroy-square, 1<sup>st</sup> Part.

Windmill-str. N<sup>o</sup> 23 to 25, & 26 to 31; John-str. N<sup>o</sup> 1 to 15, & 16 to 22; Colvill-co. in d<sup>o</sup>. Windmill-str. N<sup>o</sup> 12 to 1, & 12 to 61.

Charlotte-str. N<sup>o</sup> 6 to 1, and 98 to 87; D<sup>o</sup>. 7 to 17; Henry-str. Charlotte-str. N<sup>o</sup> 26 to 81, and 18 to 20;

Goodge-str. - N<sup>o</sup> 36 to 29, & 28 to 21; Little Charlotte-str. Charlotte-str. N<sup>o</sup> 80 to 57, & 21 to 14; Bedford-passage upper Charlotte-str. N<sup>o</sup> 36 to 47, & 36 to 41; Radcliff-str. N<sup>o</sup> 24 to 13, & 1 to 12; Fitzroy-str. N<sup>o</sup> 15 to 10, & 10 to 5.

London-str. - N<sup>o</sup> 61 to 51, & 17 to 10; Conway-str. & Emily-place Cleveland-str. Cleveland-new.

Newman-str. N<sup>o</sup> 15 to 14, & 1 to 14; Tottenham-str. N<sup>o</sup> 25 to 9, & 25 to 1; Tottenham-passage, Tottenham-new, and Cumberland-str. Cumberland-str.

*M. Hargrave*

[ 3 ]

## Fitzroy-square, 2<sup>d</sup> Part.

Tottenham. c. r. from Windmill-str. to Goodge-str. Kirkman's-place in d<sup>o</sup>. Goodge-str. N<sup>o</sup> 55 to 37, & 21 to 11; John-str. N<sup>o</sup> 18 to 25, & 91 to 86; Pitt-str. John-str. N<sup>o</sup> 16 to 13, & 84 to 83; Chapel-str. Tottenham-str. N<sup>o</sup> 1 to 7, & 36 to 45; Charlotte-new in d<sup>o</sup>. John's-str. N<sup>o</sup> 22 to 72; North-str. North-new, John-str. N<sup>o</sup> 71 to 60, & 19 to 36.

Howland-str. - N<sup>o</sup> 7 to 1, & 54 to 47; Little Howland-str. Little Howland-new East, in d<sup>o</sup>. Howland-str. N<sup>o</sup> 8 to 27, & 28 to 46; Howland-new West in d<sup>o</sup>. Radcliff-new, upper John-str. N<sup>o</sup> 59 to 49, & 37 to 47.

London-str. - N<sup>o</sup> 51 to 60, & 1 to 8; d<sup>o</sup>. 51 to 45, & 16 to 91; Limon-new in d<sup>o</sup>. Herford-str. N<sup>o</sup> 1 to 10, & 59 to 32; Graham-str. Fitzroy-sq. - N<sup>o</sup> 7 to 1, d<sup>o</sup>. 33 to 23; d<sup>o</sup>. 24 to 18, & 8 to 17; E. & S. side, upper Gresham-street, upper Cleveland-str. Cambridge-place, Warren-str. N<sup>o</sup> 33 to 40; upper Conway-str. Warren-str. N<sup>o</sup> 28 to 21, & 4 to 31; upper Fitzroy-str. Warren-str. N<sup>o</sup> 22 to 15, & 32 to 63; Herford-str. N<sup>o</sup> 15 to 31, & 11 to 14; Fitzroy-market Warren-str. N<sup>o</sup> 14 to 1, & 66 to 72;

Tottenham. c. r. from Tottenham-new to Goodge-str. Southampton-court Tottenham-place, Hotham-co. Mulford-place, Pancras-str. Frances-str. West, N<sup>o</sup> 1 to 7, & 70 to 28; d<sup>o</sup>. 3 to 19; Coys-gardens, all in d<sup>o</sup>.

*William B. B.*

## 1.Ash... where?

### England Circulation

*Book, 1871*

Postal Museum Archive

## 2. Postmen's walks

### *List of the Several Divisions*

*and Districts of the Inland*

*Letter Carriers, 1797*

Postal Museum Archive



accommodate the idiosyncrasies of the public, even when doing this cost a tremendous effort<sup>10</sup>. For the whole of the long nineteenth century, the clockwork functioned by the operation of thousands of skilled workers, their heads managing, complementing, supplying the geographical information that would guide the route of the mail.

As a proper pre-modern institution, the Post Office had a grand head. From 1829 the Post Office's Headquarters had been located in purpose-built Saint-Martin-Le-Grand, designed by Robert Smirke that functioned as administrative office and central clearing house for all of the London mail<sup>11</sup>. This centre, the physical centre of the Post Office in the capital, would be the first to roll in the slow but resolute path towards modernisation, a modernisation that pursued increasing efficiency for the quickly-growing institution. The clockwork needed to become a network: for this, it had to overcome the hegemony of its hierarchical centre to allow greater autonomy to its components. The dissolution of this hegemony has its beginnings in the 1857 address reform, although it would take almost a century to settle. In 1857, London was dissected into ten districts, named in relation to the cardinal points whose centre was Saint-Martin-Le-Grand – SW, EC, E, N, NW, W, WC, SE, NE and S, each getting its own distributing office. In 1917, a further division of London ensued with the numbering of the districts (this is, with the sub-division of the cardinally-named original districts). Finally, in the 1920s the County-unit system was introduced, which divided the country (and Ireland) into counties<sup>12</sup>. With this long-brewed first address reform, recipients of the postal service had to learn a new way of calling places. Thought as a method for easing the internal labour of sorting letters and parcels, the address reform meant that the public had to incorporate in their knowledge of the territory a systematised mode of naming places, artificial in the measure that the postal counties didn't necessarily correspond to historical county



**3. Postal districts**  
*Sketch Map of the  
London Postal District  
with the Subdivisions,*  
E. Stanford, 1856  
British Library

demarcations<sup>13</sup>. A single new line on an envelope thus slowly started to supersede the need for the Book: lists of addresses, Books of Circulation, and other such-like aids to sorting, were all replaced by a single, yet systematised, set of words that made the territory (or the knowledge of its organisation) available to everyone.

### Frame

The first address systematisation only went so far: even if the sorter's mind didn't need to be concerned with interpreting the new descriptions of locations, the labour of sorting continued to be manual. Until the mid-twentieth century, the Post Office's clockwork was not based on the machinery of the industrial revolution, but relied on the actions of each individual sorter. To bring these actions into agreement, they were all performed within a frame – a wooden frame, present in almost every stage of the mail's circulation. Part furniture, part apparatus, the sorting frame, although adapted to the specificities of each post office's circulation paths, was basically the same no matter its location. A wooden desk fitted with a vertical set of pigeonholes, it sat on top of wrought-iron legs and had a swing seat. The sorting frame wasn't just functional infrastructure, but the pride of an Empire; a 1937 specification thus reads:

*The woodwork, except where otherwise specified, to be British Columbia fir or silver spruce (Nº 2 clear and better), or other suitable Empire grown timber. Birch to be Canadian yellow, all to be straight, sound, bright, of natured growth, well conditioned and thoroughly seasoned, free from sap, shakes, splits, warp, wane, large, loose or dead knots, rot, dote, soft spots, incipient decay or other defect.*<sup>14</sup>

Designed by the Fittings Department of Her Majesty's Office of Works, the sorting frame is part of that host of nineteenth-century or early-twentieth-century man-powered furniture-machines.

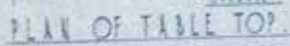


**4. Pigeon holes**  
Photograph of the  
King Edward Building,  
sorting office, 1935  
Postal Museum Archive



**5. Sorting frame**  
Lantern slide, circa 1930  
Postal Museum Archive

87-1231-3044-3045



1. The first step in the process of identifying a problem is to determine the nature of the problem. This involves gathering information about the problem and its context. The next step is to define the problem in terms of specific, measurable, and achievable goals. This is followed by identifying the causes of the problem and developing a plan to address them. The final step is to implement the plan and monitor the results to ensure that the problem is resolved.

[illegible]

1. THE FIRST PART OF THE REPORT  
 2. THE SECOND PART OF THE REPORT  
 3. THE THIRD PART OF THE REPORT  
 4. THE FOURTH PART OF THE REPORT  
 5. THE FIFTH PART OF THE REPORT  
 6. THE SIXTH PART OF THE REPORT  
 7. THE SEVENTH PART OF THE REPORT  
 8. THE EIGHTH PART OF THE REPORT  
 9. THE NINTH PART OF THE REPORT  
 10. THE TENTH PART OF THE REPORT

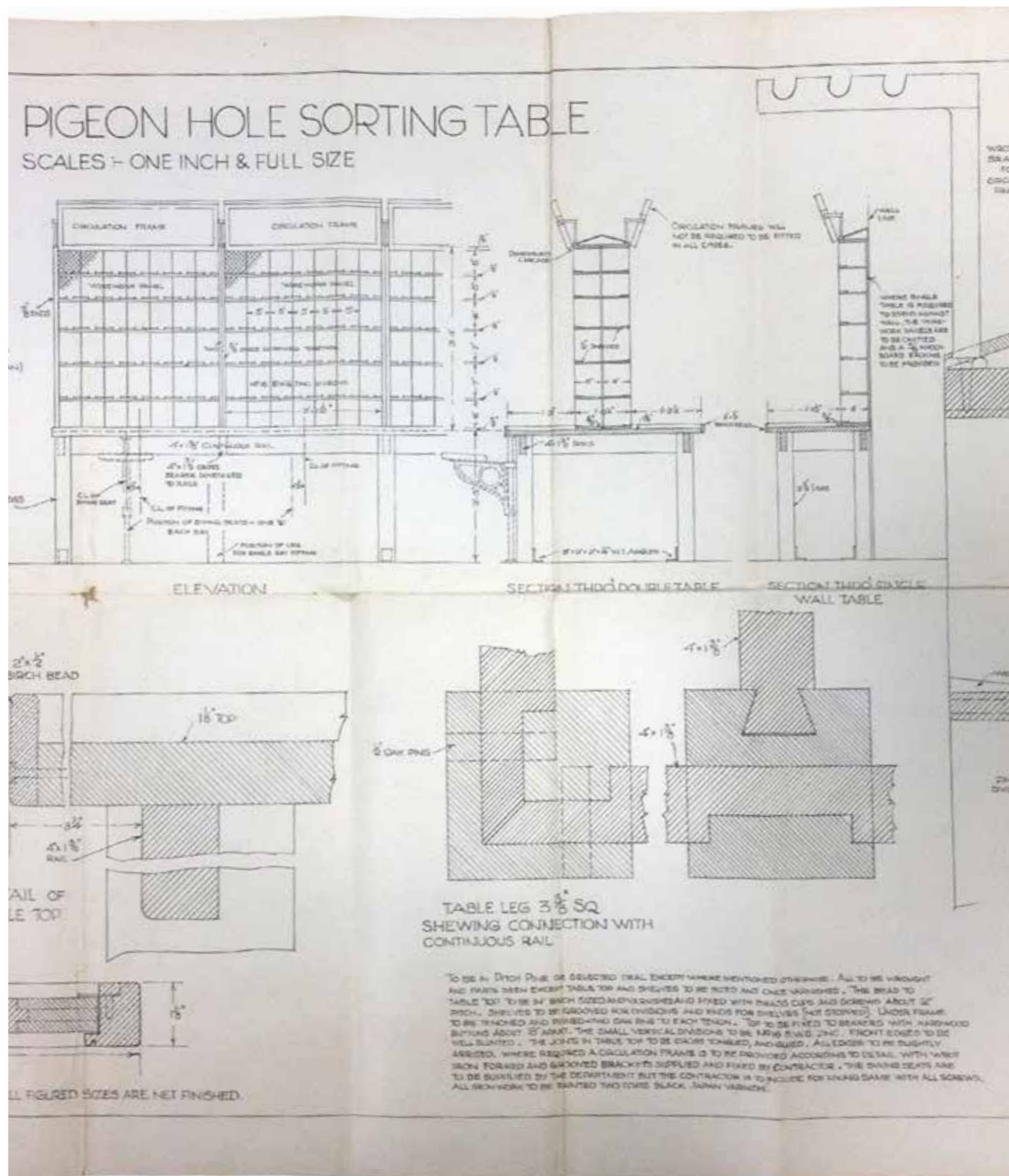
NOTE

⑥ Explain the difference between a simple and a complex sentence.  
A simple sentence contains one independent clause. A complex sentence contains one independent clause and at least one dependent clause.

⑦ Explain the difference between a compound and a complex sentence.  
A compound sentence contains two or more independent clauses joined by a coordinating conjunction. A complex sentence contains one independent clause and at least one dependent clause.

⑧ Explain the difference between a compound and a complex sentence.  
A compound sentence contains two or more independent clauses joined by a coordinating conjunction. A complex sentence contains one independent clause and at least one dependent clause.





**7. Plan of the 42 pigeon  
hole sorting table (detail)**  
HM Office of Works, 1932  
Postal Museum Archive

Before the address reform, outward mail was first sorted into twenty-eight possible divisions (four rows of seven compartments), each corresponding to divisions of the railway's network. After this, each bundle would again be segregated into another set of twenty-eight compartments, this time corresponding to specific sequences of railway stations<sup>15</sup>. The resulting mail bags then went to the Travelling Post Offices, where sorters stood in front of another frame, often composed of forty-eight pigeonholes distributed in six rows of eight: "Experience over many years had demonstrated that the optimum number of selections for manual sorting [was] 48 in six rows of eight boxes. Beyond that sorting [was] slowed down and the rate of mis-sorting increase[d].<sup>16</sup>" Letters would be placed on the desk, face up, and sorters would quickly read addresses, one hand placing a letter into a pigeonhole while the other held a new envelope, eyes quickly scanning the new address to be sorted. After arriving to the final stage of a letter's circulation, this is, as it entered inward sorting, postmen would again distribute the incoming bag of letters in a sorting frame, each compartment holding a stack ready to be picked up by postmen on their way to their local daily route.

From the more than 8,000 possible addressing locations, after the reform there were only 116 words to be written as last line on a local envelope. Clustered together into forty-six units (a number close enough to the preferred forty-eight pigeonholed sorting frame) these words became the organising principle for outward sorting: "[s]orters in those days were taught to read addresses upwards – first the county and then the post town. (...) Postmen who did the inward sorting read the addresses downwards as they [were] not concerned with the post town<sup>17</sup>." A "wrot (sic) iron or steel [frame] of British manufacture, neatly forged and riveted...<sup>18</sup>", this time in a horizontal position, the Drop-Bag Fitting system had forty-six bags suspended and, in front of it, skilled sorters would quickly discern to which bag each letter had to go<sup>19</sup>. This reorganisation cut the need for second sortings, reduced mistakes, and made the trip for the resulting bag a less convoluted one, as now postal destinations matched (closely enough) geographical ones. The Drop-Bag Fitting system thus both responded to a policy and shaped it, the reduction of addresses being commanded by the possibilities given by the sorter's body – the head's ability to hold destinations in, and the hand's capacity to drop them out.

Until the inter-war period, the Post Office's evolution had been mild – its most important change, the refinement of the non-system into a perfectly synchronised

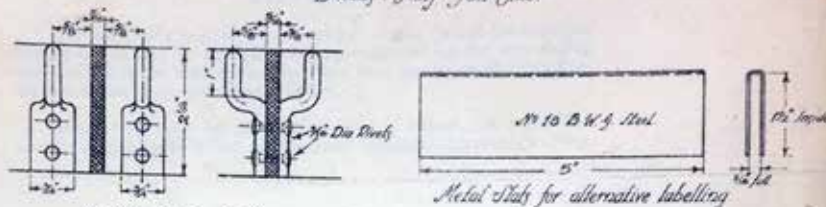


## DROP BAG FITTING.

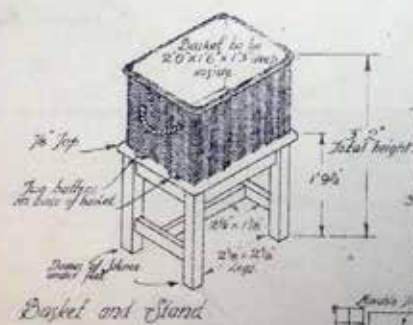
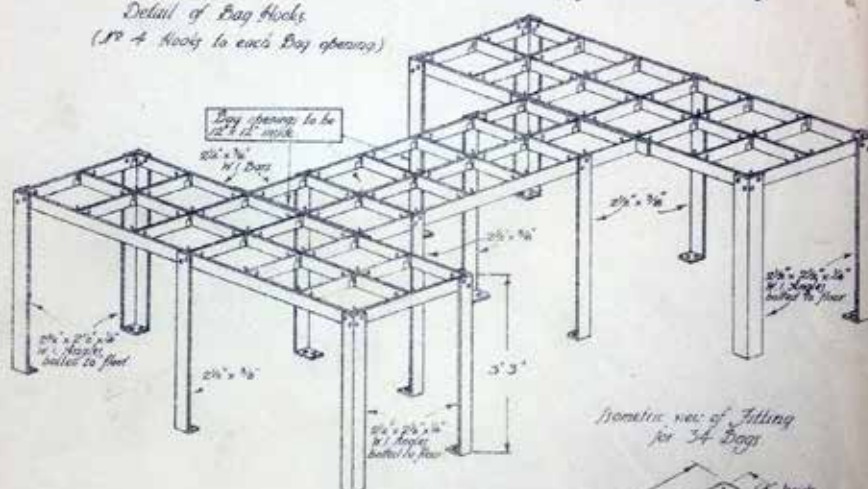
*For Newspaper and Packet setting.*

*Showing alternative methods of feeding.*

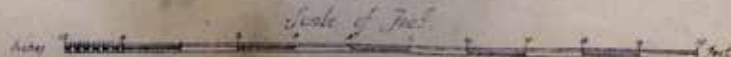
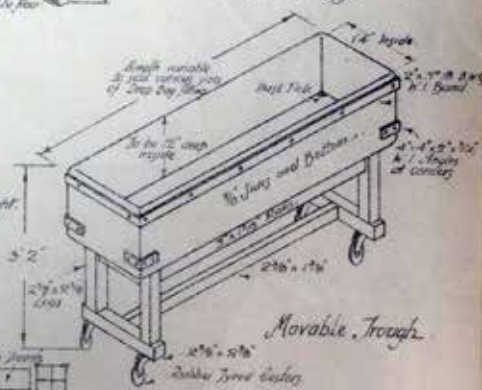
*Details: Half Full Size.*



*Detail of Bag Hooks  
(10 + Hooks to each Bag opening)*



*Basket and Stand*



8. Drop Bag Fitting  
General Post Office and the  
Office of Works, circa 1920  
Postal Museum Archive

manual system<sup>20</sup>. The car, however, accelerated things: from the late 1920's, the Post Office started introducing the use of automobiles in its daily routines, first only in the main posts and then into its rural services – the 1932 Morris Minor 3 cwt 35 cubic feet a specially designed van to fit the Post Office's requirements<sup>21</sup>. By the beginning of the Second World War, motorised vehicles had simplified the circulation of letters, reducing the dependence on the railway network, and had become the dominant means of rural distribution. Mechanisation came hand in hand with motorisation, and the sum of the two would, in less than thirty years, completely transform the post office, both in terms of its institutional characteristics and of its internal functioning.

### Code

The modernisation of the Post Office started in the 1930s and its beginnings were heavily mechanical. From the London-wide Mail Rail (opened in 1928, and running between Paddington and Whitechapel) to the fitting of conveyor belts, chutes and lifts inside the largest sorting offices<sup>22</sup>, the Post Office was trying to catch up with the machine age. The central activity of the Post Office, sorting, was also tackled, and in 1935 two twenty-tonne, Dutch made, Transorma machines were trialled in Brighton. The solution to the Post Office's modernisation, however, laid not in the import of cumbersome machines, or in the mechanisation and motorisation of circulation, but with a change that permeated all the different scales of the Post Office's network, from household to nation.

Systematising the nation's addresses had been highlighted by the use of the Transorma machines, as with them codes assigned to addresses had to be typed by the machine operators. The possibilities, however, were only local, as the sorter had to still interpret addresses and translate them from memory into a sorting instruction<sup>23</sup>; the task proved alienating. A different approach was advanced from within Dollis Hill, the Post Office's own Research and Development Department<sup>24</sup>. As early as 1946, R.O. Carter and W.T. Gemmel enunciated the idea of the postcode. As Carter put it: "It is envisaged that every street, or possibly every address would have its individual code, which would be noted or remembered with the name and address of a correspondent in the same way as are telephone numbers at the present time."<sup>25</sup> The development of such a system beckoned for the development of a machine that could eventually read codes and sort letters and parcels automatically – although by then this was still futurism. In 1959, after two years of 'maximum research effort' put into the development of a coding and sorting machine, two engineers from the Institution of Post Office Electrical Engineers wrote a paper advocating 'public coding'. With public coding, letters and parcels that came into the Post Office would *already* have the instruction of how to be sorted, making the need for a clerk to 'extract' information from addresses irrelevant<sup>26</sup>. The research department at Dollis Hill had devised a format for such coding, comprising a combination of both letters and numbers. The

innovation of the British Post Office's postcode was that, on top of designating the final location for a letter's destination, it also gave the position of the last sorting office to handle that letter: in other words, in one code two kinds of information were assembled, one that was internal (the first part, or outward information) and another that was external to the Post Office (the second half, or inward information). This new sorting instruction, therefore, brought together into one system all the elements that composed the post office's network, its innovation being the consideration that this system also comprised each and every household in the territory.

The fact that the postcode is an alphanumeric construction gives the wrong impression that it only inhabits a world of abstraction, playing the role of a *Deus ex machina* in the drama of the Post Office's modernisation. The postcode is far from that: far from being just machine language, the result of statistical analysis and combinatory processes, the postcode may have been devised in the mind but was measured, traced and paced by the hands and bodies of the Post Office's engineers in Norwich, England, in 1959<sup>27</sup>. The postcode was not only imagined, but also designed (drawn, planned) and constructed. Cataloguing every household not only recorded what was there but also gave it flesh (albeit an alphanumeric one) in the new systematic double of the territory. A 1959 internal report drafted gives the full narrative of how the postcode was constructed<sup>28</sup>. The engineers didn't start from a *tabula rasa*, but used several sources to compose a detailed inventory plan of Norwich: "an analysis was made of all of the roads and streets in Norwich, using as a basis Kelly's Directory, the Electoral Register Summary, and the Town and Country Planning Department of the Local authority,<sup>29</sup>" each providing an image of both present and future of the land's occupation. The analysis of delivery patterns to large firms and individual households informed the allocation of postal codes: large firms received individual codes, so that sorting could be speeded up. Existing long roads, which were sometimes served by several postmen, were split into sections so as to form part of different postmen's routes. This process also pushed for a systematisation of place names, since engineers found many variations between the sources they used.

When the allocation of the letter part of the code came into question, the engineers considered several ways of doing it: they first thought of imposing a grid over the city, but discarded it because the grid would only relate to the city spatially, when in fact the postcode had to reflect patterns of occupation<sup>30</sup>. They also considered using a 'spiral principle beginning in the centre of Norwich', a method that was discarded because it would have been difficult to suit both the current manual system and the mechanised one of the future. Finally, the team decided for a 'segmentation principle': looking at a map of Norwich, the engineers saw that the city is composed by a series of radiating long roads, which divide the city into segments. They used these and the crossing river as limits for each section, allocating the code letters in a clockwise direction according to the number of roads within each segment. This method worked

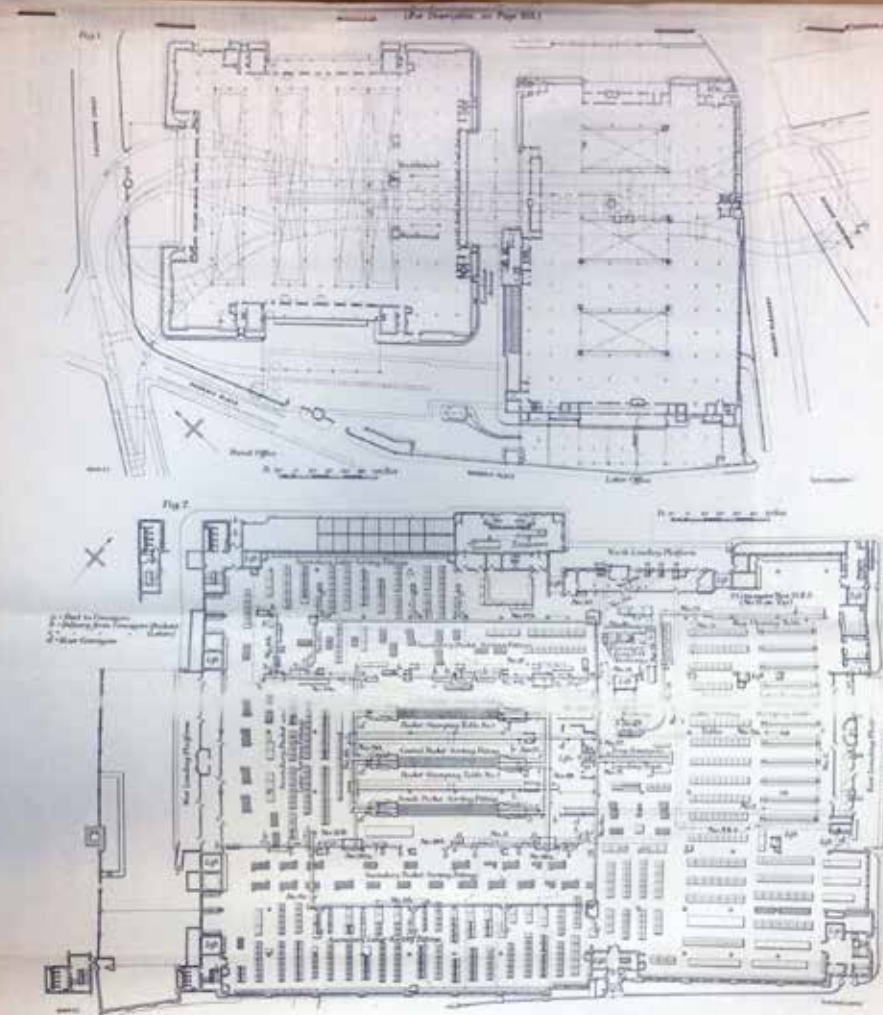


FIG. 3. LOOKING DOWN CORRIDOR IN GROUND FLOOR

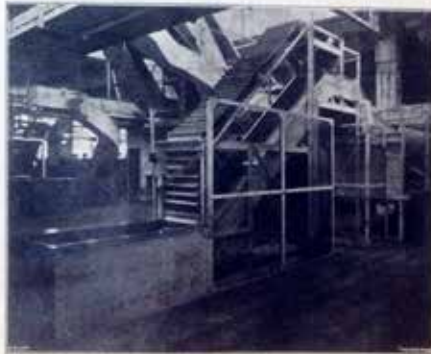


FIG. 4. LOOKING DOWN CORRIDOR FROM GROUND FLOOR TO FIRST FLOOR

9. Plans of Mount Pleasant  
In Mount Pleasant: Technical  
Description of Postal  
Mechanisation in the Inland  
Letter Section and the  
London Parcel Section, 1939  
Postal Museum Archive

well in both manual and mechanised sorting and also gave room (or letters) for new developments. The density of the rural area was analysed as well and four letters were allocated to it. After defining each segment and assigning the alphabetic component of the postcode, the engineers set to allot the numeral part of the code – the part that dealt with the smaller scale. For this, the city was divided into six sections, each with a number of letters, and each section was analysed using the Kelly's Directory, a large-scale map of the city and “exact details of each Postman's walk<sup>31</sup>.” After this analysis every road with a postal code was “outlined on the map in a distinctive colour appropriate to a particular postman's walk<sup>32</sup>.” They devised methods to avoid repetition and to allow for urban development, both inside and outside the current city limits, and always having in mind the practicality of the postman's walk. For the rural area of Norwich, they chose to adopt a ‘named locality basis’, the challenge here being the setting of boundaries, both between larger areas and around groupings of smaller ones. They followed natural boundaries, cultural ones (such as parish limits, when possible), and common sense, in order to judge over relativity – two properties that may be deemed ‘close’ in one context might be completely apart in others.

The construction of the first postal code was a very material endeavour. Maps, inventories and registers were its basis, but decisions were always taken with the practicality of the postmen's route in mind – with the precedent of how a practice had been kept and with how changes could improve it. Efficiency in sorting was its goal, as the postcode was never something else than an instruction for sorting. The efficiency provided by a systematised way of addressing letters was accompanied by the introduction of mechanised sorting: at the same time that the whole of the country's addresses was being translated into alphanumeric characters, a total redesign of the post office's interiors ensued. The thinking head, the sorting hand and the walking legs would all enter into contact with a host of laborious and efficient machines. The result of this contact changed not only the way in which the interiors of the Post Office looked and work, but also ended up affecting the territory it served.

### **Machine**

One of the largest sorting offices in London, Mount Pleasant was built in 1889 in the area of Clerkenwell<sup>33</sup>. Streets are hilly there, and the building owes its name to the former mound of rubbish that used to sit in the area (which was allegedly shipped to Moscow to furnish materials for the reconstruction of the Russian capital following the Napoleonic wars). Before the Post Office was erected, Coldbath Fields Prison occupied the site from the seventeenth century until 1877, when it was closed – an engraving of the prison shows several orthogonally arranged severe-looking buildings, together with others disposed in radiating fashion, plus some discreet gardens. The first Post Office building was to house the Parcel Post and the postal stores, and in 1900 the building was extended into what would be

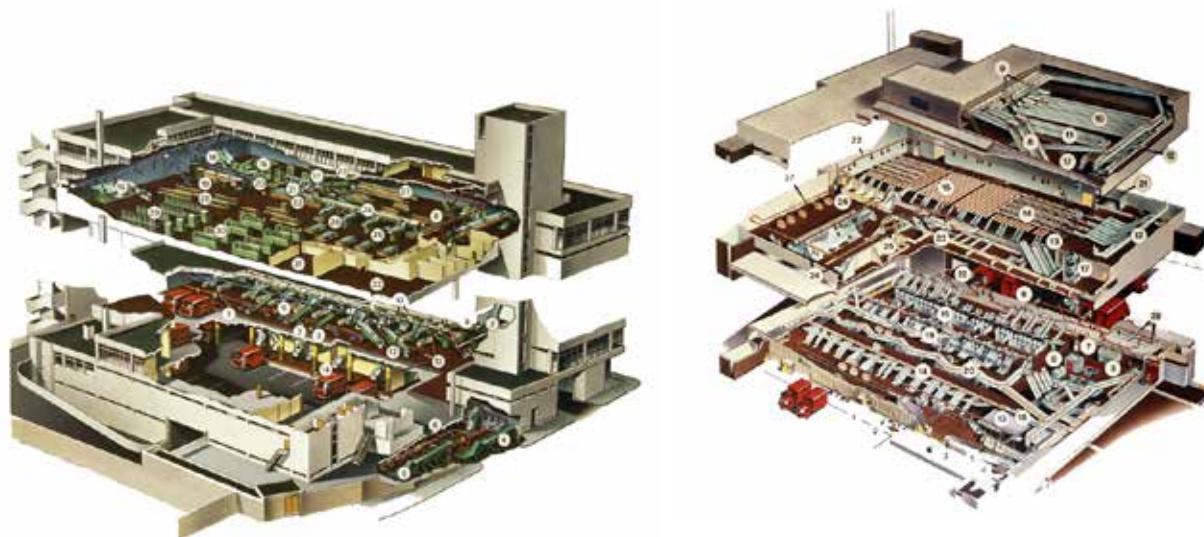


later known as the Old Building. In 1926 a New Building was added to the North of the Old building, and all buildings, old and new, were finished by 1934.

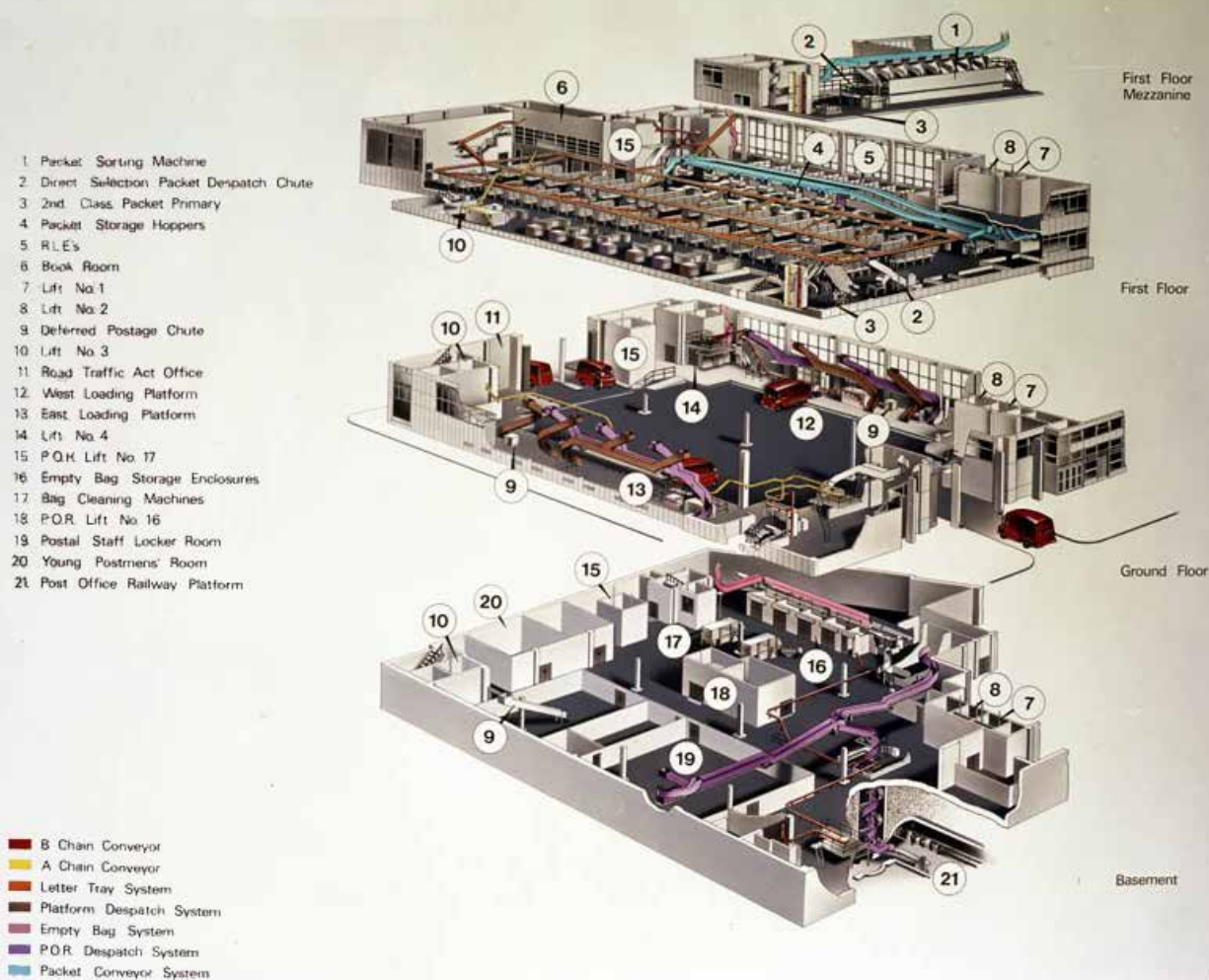
After Saint-Martin-Le-Grand ceased to be the sole Circulation Office for London, both Mount Pleasant Postal Centre and the King Edward Building concentrated a great part of the metropolis' postal work. Mount Pleasant handled the Parcel Section as well as an Inland Section (serving the Eastern Central and Western Central districts of London) and had the biggest Mail Rail station, with more than 800 trains passing underneath the buildings<sup>34</sup>. Designed by the Senior Architect of the Office of Works, A.R. Myers, the buildings were meant to "give large and uninterrupted floor space" for the sorting of letters and parcels, with two and a half acres of space for the Sorting Office. The structure was in steel and reinforced concrete and the building's exteriors were finished in white 'Snowcrete' cement. The New Building housed more than 6,000 workers, between administration personnel and sorters.

When the New Building came into use, it was already part mechanised: conveyor belts, stamp cancelling machines, overhead conveyors, guide pins that automatically led baskets of sorted correspondence into the next stages, chutes and lifts across floors were all part of the plan: "...the machinery in the new Mount Pleasant Letter Office marks a definite and noteworthy advance."<sup>35</sup> In 1938, the journal "Engineering" devoted several articles to the description of the mechanical advances accomplished in the Mount Pleasant building<sup>36</sup>. Together with a wide array of pictures of the mechanical fittings, the text is illustrated with plans that show the extent of the mechanisation achieved: the entirety of the floor space is occupied by more and more machines, all connected and in apparent independence from any external interruption.

This mechanisation wouldn't be the last. Accompanying the development of the postcode, the greatest effort was put into the creation of sorting machines. For this, already in 1946 the Mechanical Aids Committee, which had under its wing not only coding but also sorting machine design, promoted experimental work in all levels of the sorting process<sup>37</sup>. The basement of Mount Pleasant was where the first attempt at a sorting machine was trialled: the "Interim Machine" failed, but provided experience for future attempts. By the 1960s, after many experiments, trials and failures, the complete line of work had been mechanised: first, mail was loaded into a Segregating Drum, which separated parcels from letters; then, letters were fed into an Automatic Letter Facer, which separated letters by class, positioned them in the right direction and stack them neatly. These stacks were fed to the Single Position Letter Sorting Machine (the improved version of the Interim Machine) where operators typed a code, triggering the printing of a series of phosphor dots to the envelope; finally, the Automatic Sorting Machine read the information contained in the dots and sorted the letters to the final selection boxes<sup>38</sup>. By 1961, ambitions were high and research was directed towards Optical Character Recognition, this is, a machine that could read the public's handwriting – a feat that was only finally realised in the 1990s<sup>39</sup>.



## Eastern District Sorting Office



**10. Letter sorting machine**  
Sheffield Head Post Office,  
isometric plan view, GPO  
Illustration Studio, 1972  
Postal Museum Archive

**11. Parcel sorting machine**  
Southampton Parcel  
Concentration Office,  
isometric plan view, GPO  
Illustration Studio, 1972  
Postal Museum Archive

**12. (bottom) Building  
as machine**  
Eastern district sorting office,  
isometric plan views of first  
floor mezzanine, first floor,  
ground floor, and basement  
GPO Illustration Studio, 1972  
Postal Museum Archive



13. The country, sorted out  
*Aim to please – please!*,  
 GPO Illustration  
 Studio, circa 1980  
 Postal Museum Archive



Total mechanisation meant a redesign of the Post Offices premises: large machines had to be fitted into buildings that had been designed for people. As the old sorting techniques were automated, sorting frames, tables, baskets and trolleys, were displaced by the incoming machines. It cannot be clearer than the images developed by the Postal Headquarters Illustration Studio for internal circulation in 1975<sup>40</sup>: buildings have become large-scale machines, their interiors stripped of any recognisable architectural feature, furniture replaced by technology, exteriors just a carcass holding together the pieces of hardware. And just as in every sorting office interior more and more individual machines were added to a suit, every building-as-machine joined the others in the network, forming a nation-wide apparatus, clanking and beeping over the extension of the country.

### System

A sorting frame the shape of the United Kingdom, or maybe the country revealing its real organisation – that is, how it works instead of how it looks. This 1980s internal use poster, nostalgic in its representation of the Post Office's work, is nonetheless clear in its message: the country has been sorted out. The Post Office's network, both physical and immaterial, has extended to reach all the corners of the territory and it has actually replaced what formed it. Nature, landscape, railway, roads, settlements, cities are all unseen. Even the capital is unimportant: the image has no centre, London is just another selection. On the other hand, the one who stands in front of both poster and frame, the worker, is not only sorting letters: he or she is operating the country. Soon enough, however, there would be no addressee for such a piece of internal communication. Just as buildings were vacated of its functional furniture, people also left, marking a radical change in an institution that had for centuries relied on its postmen. Mechanisation, begun as a way of tackling the need for increased efficiency without affecting the well being of the worker<sup>41</sup>, finally ended up by precisely evicting him and her – those that remained becoming simply machine operators. Already in the late 1950s there had been concern about this, as when judging machine trials, two engineers lamented the loss of the geographically savvy traditional sorter<sup>42</sup>. Geographical knowledge was indeed lost as both coding and mechanisation advanced, the only knowledge needed being embedded in a code and the machines it directed.

The Post Office's network, constructed over time on top of buildings of several sizes spread over the country; railways and motorcars connecting them; furniture inside buildings that sorted mail and then machines that did; cast-iron urban furniture receiving letters and parcels; postmen moving between pillar-boxes and post offices and then post offices and letterboxes; this network started shedding its material components. First, buildings: as systematisation made sorting more efficient, large buildings that had been central for the Post Office's operations were abandoned: Saint-

Martin-Le-Grand, the centre of the 1857 London Districts, was deserted in 1910 and demolished in 1912; both King Edward Buildings, opened in 1910 and where the Post Office's Headquarters moved after leaving Saint Martin's, were vacated in 1984 and sold to foreign banks; Dollis Hill was discarded in 1975 for a new place in Martlesham Heath and transformed into flats; numerous local sorting offices were replaced by the lesser architecture of automated and more efficient warehouses. As the Post Office entered the backwaters of logistic camps, the institution disappeared: it first ceased to be a government department in 1969, then stopped being a public corporation in 2007, and in 2013 a portion of the shares entered the stock exchange, with the last ones being sold by the government in 2015. It is now a brand competing for fulfilment.

What remained, survived, soared above and even flourished after the Post Office's retreat was the postcode. The precision of the postcode to pinpoint locations, its ineffability, its systemic quality, its comprehensiveness, allowed it to emancipate from its initial restricted use and become an entity in itself, its uses surpassing those that informed its pedestrian origins<sup>43</sup>. With the popularisation of computation and the internet, the postcode even replaced the first lines of addresses (as a code is typed, alternative addresses are offered for the user to select<sup>44</sup>). And with the expanded ubiquity of smartphones, the joint operation of postcodes and digital maps substituted for the need to know place names and the use of cartography – let alone the knowledge of place itself. In place of space stands the index, and the labour of orienting oneself in the metropolis recedes not only from the built to the graphic, but to the restricted and unspoken binary language of the digital. The view it offers is not the view from above but a view from within, although whose view is hard to say: as there is nothing to see, there is neither an observer nor a place for her or him. If the postcode were a map, it would be the size of Britain; it is not, though, and not a description or even a record but only a cryptic gesture. If the map recorded for posterity, the code indicates; if orthographic drawing sought to expose a territory, the alphanumeric combination ciphers it; if cartography enlightened, the postcode obscures. The oriented subject is a permanent stranger.



1 Eadweard Muybridge's early attempts at capturing movement reveal how arrest is central to its capturing through photography. It is of interest, as well, that apart from bodies in motion, Muybridge was also fascinated by city views, although not as sequence of stills, but as panorama. See Eric Sandweiss et al., eds., *Eadweard Muybridge and the Photographic Panorama of San Francisco, 1850 - 1880* (Montréal: Canadian Centre for Architecture, 1993).

2 And even his emotions: "Charles Marville (...) was employed by [France's] Second Empire to record the old, insalubrious quarters of Paris - dating back in some cases to medieval times - that would be replaced in Baron Georges-Eugène Haussmann's radical rebuilding of Paris in the 1850s and 1860s. (...) That Marville's remarkable photos of old Paris suggest that he fell in love with what was condemned to the wrecker's ball underlines the fascination of the referent viewed through the lens." Peter Brooks, *Realist Vision* (New Haven: Yale University Press, 2005), 87.

3 Only forensic photography manages to be both embodied (that is, that the position of the photographer can be discerned from the photography) and scientific. The stillness of the photographed object enables this descriptiveness: the still object, dead body, archaeological remain, etc, cannot change anymore.

4 The three main changes were that letters would be priced by weight and not amount of sheets, there would be a uniform price regardless of the distance to be covered, and all letters would be paid for by the sender and not the recipient. For this, the stamp was a major innovation. Duncan Campbell-Smith, *Masters of the Post: The Authorized History of the Royal Mail* (London: Allen Lane, 2011), 123–128.

5 Ibid., 146.

6 Ibid., 139. and W. K. Mackenzie, O.B.E., "Postal Circulation," *The Bulletin of the Postal History Society*, no. 197 (December 1976): 16.

7 'Circulation' in Post Office parlance refers specifically to the route a letter follows from the moment it is deposited in a posting box until it is handed to the postman.

8 Unknown author, "England Circulation Book 1871 Printed for Her Majesty's Stationery Office by W P Griffith, London. Includes Places, Counties and Head Offices with Day and Night Mail Circulation Routes." (W. P. Griffith, 1871), POST 17/19, Postal Museum Archive.

9 A fine, albeit older, book of this sort is Unknown author, "List of the Several Divisions and Districts of the Inland Letter Carriers Showing the Order in Which Each District Is Served, and Intended to Facilitate the More Correct Sorting of Letters: Also to Enable Any Officer to Set the Letters on a Strange Walk, Agreeable to a Survey Taken in the Year 1796," 1797, POST 17/1, Postal Museum Archive.

10 According to Mackenzie, only with the adoption of the County Sorting framework the Post Office started imposing a form of letter addressing. See Mackenzie, O.B.E., "Postal Circulation," December 1976, 16.

11 Campbell-Smith, *Masters of the Post*, 147.

12 As Evelyn Murray states in 1927 "As every post office may have letters for every other post office, of which there are many thousands, it is obvious that a system relying entirely upon direct communication would be unworkable. Between large towns the correspondence can be, and usually is, transmitted in direct mails, but letters passing to and from the rural areas and smaller towns must be forwarded to some intermediate office which performs the functions of a clearing house... For each county or group of counties, one or more central distributing offices are selected which have a direct postal connection with all other offices in the same county or group. Letters from the smaller offices are dispatched from the office of posting to the most convenient county

distributing centre and are then sorted and included in the mails dispatched by that office." Quoted in Ibid., 275–276.

13 Mackenzie, O.B.E., "Postal Circulation," December 1976, 17.

14 Plan of the 54 pigeon hole frame. HM Office of Works, "Rigid Drop Bag Parcel Fittings (plan)," 1932, POST 91/1146, Postal Museum Archive.

15 Campbell-Smith, *Masters of the Post*, 165.

16 W. K. Mackenzie, O.B.E., "Postal Circulation," *The Bulletin of the Postal History Society*, no. 199 (May 1979): 8.

Another typical frame was the 72 in six by twelve. This, however, increased the need for a second sorting, and so the 72-pigeonhole frame was unpopular between sorters.

17 Mackenzie, O.B.E., "Postal Circulation," December 1976, 19.

18 Plan of Drop Bag Fitting. HM Office of Works, "Rigid Drop Bag Parcel Fittings (plan)."

19 Campbell-Smith, *Masters of the Post*, 275.

20 "...[M]uch of the material infrastructure of the early twentieth century was a developed version of Victorian arrangements, such as bags, trolleys, sorting frames, tables, lists and directives etc...." Peter Sutton, "Technological Change and Industrial Relations in the British Postal Service 1969-1975" (King's College London, History department, 2012), 42.

21 Mackenzie, O.B.E., "Postal Circulation," May 1979, 6.

22 Sutton, "Technological Change and Industrial Relations in the British Postal Service 1969-1975," 42.

23 Ibid., 48.

24 The Post Office Research Station was established in 1925 at Dollis Hill, London. The first programmable electronic computer was built here in 1943: the Colossus Mark 1. This and its successors were used at Bletchley Park for cryptic analysis.

25 Sutton, "Technological Change and Industrial Relations in the British

Postal Service 1969-1975," 56., citing POST 17/60, Letter Sorting Machine Working Party, Papers 1-24, 1946-1954, Paper 1A, 'Mechanization of Letter Sorting: Some speculations on future developments', 20/12/46.

26 Campbell-Smith, *Masters of the Post*, 402-403.

27 Campbell-Smith talks about how Ian Cameron and Peter Milne, Assistant Postal Controllers II "found themselves assigned to spend at least a day a week with the Head Postmaster's staff in Norwich, drawing up the first ever postcode map of a British city. The basic format was handed to them; but which streets should share which digits, how many addresses should fit together as one code, what volume thresholds should be adopted for the assignment of unique numbers – these and a long tail of other postcode riddles fell to be answered by a group of young men scarcely out of the university. It was an intricate and time-consuming business, and it lasted into the early summer of 1959." Ibid., 405.

28 Unknown author, "Eastern Region. Norwich. Public Coding Experiment. Full Narrative in Connection with Scheme (document)," 1959, POST 153/223, Postal Museum Archive.

29 Ibid., 1.

30 "The difficulty with this [grid] system was that many of the codes would be allocated to open spaces where development would be most improbable. e.g. The Eaton Golf Course would have taken up a number of sections of the grid and it would be most improbable that any building development would be taking place on that land for many years, if at all." Ibid., 2.

31 Ibid.

32 Ibid.

33 Unknown author, "GPO Mount Pleasant (brochure)," 1934, POST 91/2692, Postal Museum Archive.

34 Ibid., 8-9.

35 Ibid., 9.

36 Unknown author, "Mount Pleasant: Technical Description of Postal Mechanisation in the Inland Letter Section and the London Parcel Section (copy of Articles Published in the Journal 'Engineering', September-December, 1938)," 1938, POST 91/732, Postal Museum Archive.

37 "Mr J.E. Yates of the Postal Services Department, overseeing sorting machine R&D, was explicit about this from the outset: '...the basis of the Working Party's programme was to mechanise all processes ... from the time of arrival ... to the bagging off stage... Letter collections would be fed, via hoppers, into a mechanical segregator and facing machine, whence the letters would pass mechanically through a stamp cancelling machine, thence be fed automatically to a machine sorter who would read the address, and code for ... subsequent mechanical sorting... It [is] hoped that bundling would eventually be done without human intervention. It was with this ultimate picture in mind that the Working Party was proceeding.'" Sutton, "Technological Change and Industrial Relations in the British Postal Service 1969-1975," 56. citing POST 17/453, Mechanical Aids Committee Minutes, 1946-1955, Minutes of First Meeting, 24/05/46.

38 Ibid., 68.

39 Ibid., 253.

40 Unknown artist, *Aim to Please - Please! - It's up to Us to Sort the Country out (poster)*, 1975, POST 110/3315, Postal Museum Archive.

41 Or even to improve it. This is what Sutton found by studying the Post Office archives. See Sutton, "Technological Change and Industrial Relations in the British Postal Service 1969-1975," 55.

42 "Concern was expressed on the Mechanical Aids Committee from the late 1950s onwards that, in replacing traditional frame sorting, coding lessened the need for geographical knowledge

and might deskill sorting – something acknowledged by engineers T. Pilling and P.S. Gerard, who in a 1961 article in the *PO Electrical Engineering Journal* wrote about the Luton trials, commenting that reducing reliance on the skill and memory of staff would mean 'a less skilled sorter can be employed'. " Ibid., 194.

43 Despite the privatisation of the Post Office, the postcode is still managed by the Royal Mail, under the Royal Mail's Universal Service Obligation. The postcode's upkeep and administration are of national importance – any change to a postcode may involve from local authorities, district councils and local Chambers of Commerce to the area's MP. See Royal Mail PAF (Postcode Address File) Code of Practice, <http://www.royalmail.com/sites/default/files/Royal-Mail-PAF-Code-of-Practice.pdf>, accessed on 26 July 2016.

44 For the Royal Mail, the only lines that are 'postally required' are number of building and street, post town and postcode. See Royal Mail PAF (Postcode Address File) Code of Practice, <http://www.royalmail.com/sites/default/files/Royal-Mail-PAF-Code-of-Practice.pdf>, accessed on 26 July 2016.

## Conclusion

*Night Mail*, a film produced by the General Post Office in 1936, captures the functioning of the Post Office at its peak<sup>1</sup>. It crystallises many of the problems that the thesis has put forward, and so its now nostalgic but still frantic cadence will mark the beat of this conclusion. This is a film about power and precision, as it describes the multi-scalar organisation of Britain's communication system, which relied entirely in the synchronisation of complex structures. It follows a Travelling Post Office linking Euston station in London with Glasgow, Edinburgh and Aberdeen in Scotland. The 'road' is the London, Midland and Scottish Railway (LMS), the train is a Postal Special, the locomotive, a 1927 Royal Scot 6115 *Scots Guardsman*<sup>2</sup>. Apart from the train, the film features people talking on phones, people pulling trolleys, people catching bags, people servicing machines. It also shows characters from the outside: labourers fixing railway tracks, signalmen pushing levers, farmers waiting for their post, dogs chasing birds, birds taking flight. The film has the relentless rhythm of the train pushing through, and nobody is exempted: even the most pastoral settings are timed and framed by the speeding train. *Night Mail* describes how the nation-sized clockwork functioned by emphasising its rhythm, the weight of the system, the materiality of the country's organisation. Within the iron network, multiple spaces, from singular desks to rooms, compartments, stations and expanded railway tracks, host different components that are linked into a single function: communication.



1. The view from above  
Stills from *Night Mail*,  
Harry Watt and Basil Wright,  
35 mm (GPO Film Unit, 1936)

The first external shots of *Night Mail* are made from above. A moving camera tries to keep track of the accelerating train, but alas, it cannot. The resulting sequence is a blur, for speed makes it difficult for the view from above to come to grips with the movement taking place below. The train is undistinguishable from the rest, as metal speeds over metal and foreground blends with background. The view from above is insufficient.

Drama, when it unfolds, does not take place in symbolic spaces, but in generic, functional, infrastructural ones. Throughout the film, traditional spatial distinctions are also rendered insignificant: it is not the countryside and the metropolis what matter in this narrative, but other spatial differentiations – of movement and stasis, of operation and rest. Space has lost its primacy.

The views of the whole, whether aerial or not, do not capture what the *Night Mail* is. Space, measures and sizes are not enough to characterise the subject, for actions are the only crucial information. These take place in interiors: one scene shows the brain of the system, another its belly, a third, the system's intake, or its processing, or the final product. It is not by seeing the exterior of the train that we understand what it is about; knowledge comes only when we see the inhabited interiors. What defines the latter, however, is not its physical attributes, but their *functioning*. What happens in them is more crucial than how they look.

The film not only portrays a technological summit, but is rife with crises that are both internal and external to it. It is because the geometrical view from above captures only the immobile that it is superseded by movement. New *grapheins* must record both the immobile *and* the mobile. The *immeuble* or building, traditionally the subject of geometrical drawing, gives way to the *meuble*: the French word for 'furniture' here is expanded to cover any 'thing' that can be captured in a single drawing. From a desk sustaining a specific function to a systemic whole coordinating several, the demand for novel *grapheins* to describe them results in modern chorographies.



**2. New spaces**  
Stills from *Night Mail*,  
Harry Watt and Basil Wright,  
35 mm (GPO Film Unit, 1936)

These modern chorographies not only capture movement and stillness, but also both whole and part – they capture eye, ear and head, but in time. Furthermore, they not only *describe* space, but *prescribe* uses. For this, they exploit the possibilities of drawn and written inscriptions, in a language that diverges from the mathematical language of geometry and geography, or the pictorial one of Renaissance chorography. The language of modern chorographies, their *graphiein*, is a varied and complex composition, encompassing technical drawing, diagrams and graphs, text, lists and alphanumeric codes. The resulting prescriptions are then particular space-functions that combine the physical with the abstract.

As geometrical drawing invented modern space, these modern chorographies invent, in collaboration with their material components: non-geometric spaces, non-static spaces, non-discrete spaces of an intermediate scale and sometimes very large discrete ones, multiply occurring spaces, non-measurable spaces, spaces that are independent from any observer, spaces with their own rules, life-size, materialised graphs.

The railway is an iron network. If the word ‘network’ was coined in its modern sense by Euler’s abstraction, the material adjective denotes that before abstraction there was the physicality of the railway. As individual iron tracks were imposed over the territory, the accompanying maps connected them together into one discrete whole, a whole that spanned the entirety of the territory. The travelling subject could know this network through the experience of further stacked spaces: a moving piece of furniture, on top of a directional linear space, which at the same time crossed the very large and slowly unfolding landscape, all in a mobile relation. The experience of this material network was captured and relayed, and therefore prescribed, not only by the proto-graph denoting the whole, where there was no place for the subject, but by narratives of the unfolding territory, strip maps linearly reproducing events, and guides recording everyday life and permanent elements of the landscape, which was



**3. New landscapes**  
 Stills from *Night Mail*,  
 Harry Watt and Basil Wright,  
 35 mm (GPO Film Unit, 1936)



being produced as it was described. Bringing together this complexity was the simple homogeneity of the iron track: the smooth standard adopted by its components allowed for the constitution of a single whole. Everything that was outside (or perhaps underneath) the rail track did not belong to the network. Marking the limit between common ground space and the space of the iron network were train stations, their sheds spanning over concourses and arrested trains an actual threshold between spaces.

Roads created a system-as-space. A system would not usually be a space, but rather a concept that allows to understand how a collection of things work together, yet in the case of roads, space is a system. It is composed by a homogeneous surface made of tarmac, which establishes the difference with the ground, and by a language that defines the limits of this space. The road signs orienting and helping drivers navigate the roads relay its rules: if the driver is on the road and following them, the systemic space is in use; if they are not, the subject is in traditional common ground. The limit between this space and ground is therefore functional. The road signs display names in two ways, relational and absolute: the first being a place name, the second a coded one – the latter giving the position not in relation to the ground but to the absolute alphanumeric system. The roadside sign is thus a life-size component of a topological space-function that covers the territory at a 1:1 scale. The experience of the space of the road-as-system is marked by speed and by a disconnection with the common ground: the driver only sees the elements conforming the system when navigating it, as these are the only ones that can orient her or himself. Common ground elements of orientation, such as the position of the orient, often stand at odds with the direction the driver has to take in order to get somewhere.

The Underground cannot be seen as a whole and therefore can only be experienced partially. It is an interior space with the unique quality of having no exterior. Albeit only experienced in parts, the Underground diagram reveals the whole, and this whole is one that has no relation to any topography. Station names are either related or not, and that is all there is to know about them.

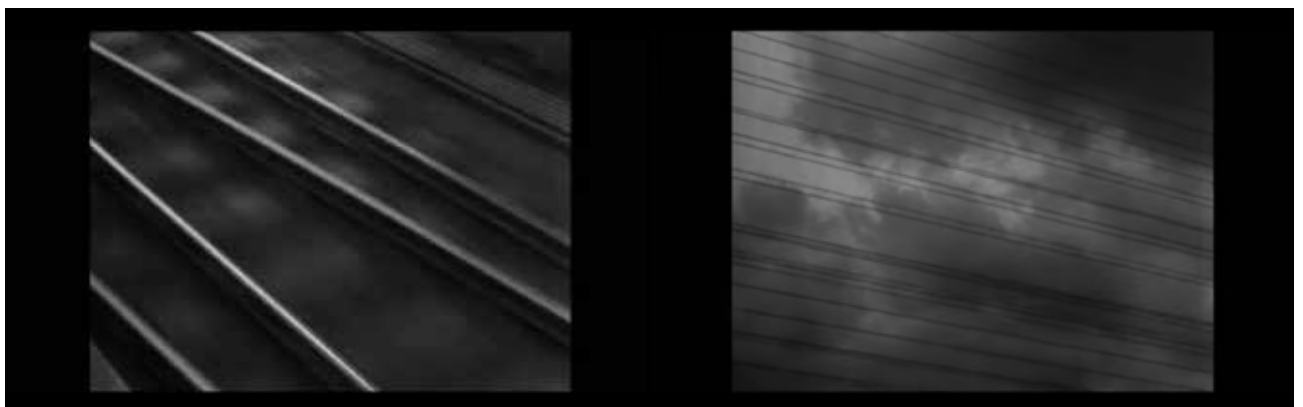


**4. Sorting letters**  
Stills from *Night Mail*,  
Harry Watt and Basil Wright,  
35 mm (GPO Film Unit, 1936)

The new space created by the Underground is one whose wholeness is therefore diagrammatic, and its interior the sum of conventional spaces (platforms, escalators, ticket halls), linear channels for movement (lifts and tunnels), and a moving room within the channels (the car). The passenger experiences them all after going through the thresholds (signs, entrance and tourniquets), the limit that announces the beginning of the new space. This interior is not architecture, but a city-sized machine. Just as Hachette's machines could be held in a page from which their workings could be understood, the Underground can also be so.

The modern, mobile, subject whose experience of movement, speed and technology changed his or her relation to the city and the territory, now approached space with a different curiosity. The metropolitan subject's demands were not only knowledge of whole and detail at the same time, but also of how the city *worked*. The size of the metropolis and the complexities of the social landscapes made the city opaque to this inquiry, but the manuals to the city (guides, maps and street finders) could make everyone into an all-seeing god – at least in relation to how to move. These modern chorographies captured the elusive whole in different ways: as a geometrically constructed topography; as a system to be accessed through codes and grids; as a paginated drawing to be flicked through for directions; as a text to be read and understood; as an interior that expelled walking to the outside. The walker could see the city as an image, a system, a page, a text or an impenetrable room, on top of his or her direct experience. When needing to find his or her way around, the metropolitan subject, whose movement is conducted by the transport technologies and whose orientation has been shaped by these manuals, does not need to look to the built surroundings, or to the permanent features of the territory, but can be content with what his or her hand holds.

In a parallel way to how this modern knowledge of movement in the city was built, the postcode is not only metaphor and symptom of modern



5. Lines  
Stills from *Night Mail*,  
Harry Watt and Basil Wright,  
35 mm (GPO Film Unit, 1936)

orientation, but its epitome. Constructed on top of postmen walks, and with sorting as goal, the search for efficiency immediately deconstructed the system that had given birth to the solution. By shedding space (furniture, buildings, trains) and by diversifying its purposes, the postcode hovers independently over the territory: it is neither bound to the specifics of sorting mail nor is particular to the network space of letter and parcel movement. Neither topography, nor topology, this spaceless function is the new identity of the territory.

As life becomes systemic, their graphic and abstract double gets more ingrained in everyday experience. Images, texts, models and codes start affecting the subject's knowledge of the city, slowly replacing the one coming from buildings, blocks, streets and topography. Spatial components are made increasingly redundant and descriptions of physical realities are taken over by codes – in a parallel way, the body's most perfect description is the one given by genetics. The recording of space and functions that the chorographies of the modern city perform is an instruction rather than a description: matter, space, time and history give way to the abstraction of the future. That such thing is possible, however, is only due to their historical and material struggles to capture time, space and movement. It is their speculative nature what makes them extraordinary and their defiant questioning of certainty (of precision, mimesis, truth) the attitude with which one has to face their contemporary outcomes.

Towards the end of *Night Mail*, the train is finally at rest. Moments ago, it was still crossing the landscape to the tempo of Britten and Auden's cadence, the moving machine gliding through valleys and bridges, weightless in its speed yet hard at work with effort. Then, as morning comes over the northern towns, the train finally exhales its last vapour clouds. As its night's work ends, the engine stops and the now immobile machine glimmers under the rising sun, its metal belly being rubbed by engineers. We know, however, that this stillness, whether temporal or definitive, is only apparent: the system ticks on.



**7. Finally, at rest**  
Stills from *Night Mail*,  
Harry Watt and Basil Wright,  
35 mm (GPO Film Unit, 1936)

## THE CHOROGRAPHY OF THE MODERN CITY

**1** Harry Watt and Basil Wright, *Night Mail*, 35 mm (GPO Film Unit, 1936).

**2** For more details about *Night Mail* see Richard Barsam, *Nonfiction Film: A Critical History* (New York: Dutton, 1973), 94–97. For a contemporary interpretation, see Ingo Berensmeyer and Christoph Ehland, eds., *Perspectives on Mobility*, Spatial Practices 17 (Amsterdam: Rodopi, 2013), 14–22.





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10. Nottingham maquette. Jock Kinneir and Margaret Calvert, circa 1960, Saint Bride Library
11. Northchurch maquette. Jock Kinneir and Margaret Calvert, circa 1960, Saint Bride Library
12. Diagram showing bad arrangement of signs. Ministry of Transport Traffic Signs Manual, circa 1965, Saint Bride Library
13. Diagram showing better arrangement of signs. Ministry of Transport Traffic Signs Manual, circa 1965, Saint Bride Library
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19. District railway guard standing by a track in Hammersmith demonstrating a signal with his right hand, print from a series on manual and mechanical signalling, Topical Press, 28 April 1931, London Transport Museum, 1998/78355
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5. Letter sorting frame, lantern slide, circa 1930, Postal Museum Archive, POST 2011-0266/24
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11. *Southampton Parcel Concentration Office*, isometric plan view, GPO Illustration Studio, 1972, Postal Museum Archive, POST 118/6182
12. *Eastern District Sorting Office* (Whitechapel Road, London EC1), isometric plan views of first floor mezzanine, first floor, ground floor, and basement, GPO Illustration Studio, 1972, Postal Museum Archive, POST 118/6173
13. *Aim to please – please!*, GPO Illustration Studio, circa 1980, Postal Museum Archive, Unnumbered 062

## Conclusion

1. Stills from Harry Watt and Basil Wright, *Night Mail*, 35 mm (GPO Film Unit, 1936)
2. Stills from Harry Watt and Basil Wright, *Night Mail*, 35 mm (GPO Film Unit, 1936)
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6. Stills from Harry Watt and Basil Wright, *Night Mail*, 35 mm (GPO Film Unit, 1936)

